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Between inertia and adaptation – State and evolution of corporate environmental strategy

Submitted by

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Summary of thesis

Companies in the 21st century are exposed to a variety of pressures to respond to a plethora of environmental issues. Understanding how these issues impact companies over time is, therefore, important for corporate practitioners and policy makers alike.

This thesis investigates the state and evolution of corporate environmental strategy with the help of a multi-study, longitudinal research design. Theoretically grounded in complexity theory, a conceptual framework is developed that portrays organisations as open systems within which agents interact and attempt to improve organisational fitness. By conceptualising the organisational metaphor of 'rugged fitness landscapes', firms are depicted as complex adaptive systems searching for peaks on a constantly changing fitness landscape in order to guarantee economic long-term profit *and* survival.

While study one examines environmental responses among a stratified sample of UK companies through repeated interviews both in 2006 and 2008, the second study draws on KLD data from S&P500 corporations for the period 1991 to 2006 by distinguishing between changes at firm and at population level.

The findings suggest that the state and evolution of corporate environmental strategy are effectively subordinated to contributing towards firms' fitness, whereby firms mostly attempt to remain profitable and obtain social legitimacy. Even over longer periods of time this behaviour has not changed markedly, except that starting from around 2004 higher levels of oil prices and lower interest rates have spurred more proactive environmental changes among a number of firms. Equally, different motivations, individuals and contextual factors appear to influence the varying patterns of evolution.

The thesis fills a gap in the existing literature with respect to the lack of conceptual and empirical contributions about the evolution of corporate environmental strategy by providing new insights into how firms are responding to environmental issues over time and by extending various strands of theory.

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

News reports and editorials across the media about the salience of firms' environmental responsiveness are nothing new and, if anything, their number is growing even more rapidly. Along with the continuing diffusion of management academia with this topic, they provide robust evidence for the changing socio-institutional environment for business organisations. Additionally, given the ongoing political debates and activist protests about, for example, carbon emission trading agreements and taxation, energy production and rising raw material costs as well as the reduction in biodiversity, environmental issues have reached an unprecedented level of attention and salience. This is particularly true for those firms directly affected but also for those in emerging economies where the consequences of economic growth on environmental degradation are equally becoming increasingly visible. On the basis of such global developments – notwithstanding wider financial and economic woes – corporate responses towards managing environmental issues have by now widely entered the management mainstream. In fact, anecdotal and empirical evidence suggests that firms are more or less intensively engaged in finding solutions to their exposure to environmental concerns (for instance, Hart and Milstein, 2003; Hoffman, 2005; Karan and MacLean, 2003; King, 2000; Kolk and Pinske, 2004; Lash and Wellington, 2007; Murrillo-Luna *et al.*, 2008; Schwartz, 2009).

1.1.1 ORGANISATIONS AND THE NATURAL ENVIRONMENT

Significant strands of academic research suggest that corporate management of environmental issues should be viewed in broader terms within the context of corporate social responsibility (Berry, 2004; Hart, 1997; Waddock, 2008; Wood, 1991a, 1991b), and highlight firm-level responses to environmental issues and concerns (Sharma and Vredenburg, 1998; Steger, 2000; Ulhøi and Madsen, 2009). Perhaps the largest body of this research examines the benefits and costs that arise for firms from engaging in voluntary environmental management practices, and what, if any, incentives and obstacles exist (Ambec and Lanoie, 2008; Berrone and Gomez-Mejia, 2009; Biondi *et al.*, 2000; Christmann, 2000; Clemens, 2006; Hillary, 2000; Morrow and Rondinelli, 2002; Roome, 1992).

This is reflected in a large body of academic literature examining the corporate management of environmental impacts and drawing upon many disciplinary

perspectives (Green *et al.*, 1998; Orsato, 2006; Peattie, 1992; Rao and Holt, 2005). Within this body of work, two primary strands of research have emerged. The first strand aims to characterise the nature or state of corporate environmental management through the development of typologies of environmental strategies (Aragón-Correa *et al.*, 2004; Henriques and Sadorsky, 1999; Orsato, 2006; Sharma and Vredenburg, 1998; Winn and Angell, 2000). Within these conceptualisations, a primary distinction has been proposed between proactive environmental responses and reactive environmental responses, the latter being largely stimulated by institutional pressures such as legislation and regulation (Aragón-Correa *et al.*, 2004; Henriques and Sadorsky, 1999; Hoffman, 1999; Sharma and Vredenburg, 1998). Several contributions have viewed organizational responses to environmental issues as part of an evolving, historical process (Post and Altman, 1994), for instance, Berry and Rondinelli's (1998) three chronological stages of environmental thinking in companies. Karan and MacLean (2003) describe the evolution of environmental, organisational and staffing approaches in the context of events over the past several decades and provide some form of prediction that in the near future 'corporations will be held accountable for responsibly using resources, both human capital (e.g., employees, the community, and other stakeholders) and natural capital (e.g., the earth's resources)' (Karan and MacLean, 2003: 2-151). The latter also resonates with the growing calls to perceive of environmental responsiveness as part of a wider drive towards achieving corporate sustainability (Stead and Stead, 2008).

A second key body of research focuses on exploring the benefits of managing corporate environmental impacts more systematically, either conceptually, drawing on resource-based theory, institutional theory, stakeholder theory, or economic theory (Aragón-Correa *et al.*, 2004; Christmann, 2000; Hart, 1995, 1997; Orsato, 2006; Porter and van der Linde, 1995), or through empirical analysis of the relationship between corporate financial performance and environmental performance (e.g., Bansal and Bogner, 2002; Christmann, 2000; Clemens, 2006; Hillary, 1998, 2000; Sharma and Vredenburg, 1998). For instance, conceptual contributions have highlighted that firms proactively managing their environmental impacts can attract environmentally-concerned consumers, avoid costs of non-compliance with environmental legislation, contribute to improved resource efficiency, and lead to a process of continuous learning from multiple stakeholders (Aragón-Correa and Sharma, 2003; Berry and Rondinelli 1998; Porter and van der Linde, 1995). Consistent with this notion, empirical contributions

have identified a range of financial benefits to improved environmental performance and stressed the, occasionally very significant, reputational, financial and penal consequences of non-compliance with environmental laws and regulations (Ambec and Lanoie, 2008).

1.1.2 DEFINITION OF CORPORATE ENVIRONMENTAL STRATEGY

Given such growing pressures and reasons to engage with environmental issues, the academic and practitioner-oriented literature has attempted to define firms' environmental management practices. The most useful definition in this regard comes from Sharma (2000) who declared that 'the environmental strategy of an organization here refers to 'a pattern in action over time' (Mintzberg *et al.*, 1989: 27) intended to manage the interface between business and the natural environment … Environmental strategy refers to outcomes in the form of actions firms take for regulatory compliance and to those they take voluntarily to further reduce the environmental impacts of operations' (Sharma 2000: 682). Important in this context is the before mentioned differentiation between largely *reactive* responses to environmental issues that are predominantly driven by a desire to comply with legislation and regulations, and those that are characterised as being more *proactive* in their nature, commonly referring to any corporate action that goes 'beyond compliance' (Aragón-Correa *et al.*, 2004; Henriques and Sadorsky, 1999; Orsato, 2006; Sharma and Vredenburg, 1998; Winn and Angell, 2000).

1.1.3 THE EVOLUTION OF CORPORATE ENVIRONMENTAL STRATEGY

Notwithstanding this general growth in the literature on corporate environmental strategy over the recent decades (Bansal and Gao, 2006; Etzion, 2007; Karan and MacLean, 2003; Stead and Stead, 2008), much less is known about the long-term trends of such strategies (Kallio and Nordberg, 2006). Despite a great many detailed cross-sectional analyses of firms' environmental responsiveness in a variety of industries, countries and from all firm sizes, there is an ominous absence of knowledge in the literature about whether firms have really changed over all these years, if at all, and in such a case, why and how this could be explained. In that sense, there is a lack of understanding how the different causes fit together, what the purpose and mechanisms are behind such changes, and whether some or all firms respond to environmental issues in a similar fashion. More specifically, what is missing is a systematic analysis of the

evolution of corporate environmental strategy among a much greater and wider population of firms, which would illustrate, in how far the observed snapshots in time of companies' behaviour with respect to environmental issues have endured and/or developed. So far, the only real attempts to study corporate environmental strategy using longitudinal research approaches have been published by Lee and Rhee (2007), Bansal (2003), Hoffman, (1999) and Winn and Angell (2000). And while these papers make insightful contributions to our knowledge, their approaches nonetheless remain unsatisfactory in that they study only a small number of particular industry sectors, and they thus fail to explore the general long-term patterns of environmental strategies among a wider population of firms. Similarly, scholars have argued for the need to conduct more multi-level and multi-systemic research in order to account for the multi-stakeholder and open-systems nature of organisational reality in the context of environmental responsiveness (Bansal and Gao, 2006; Porter, 2006, 2008; Kallio and Nordberg, 2006; King, 1995; Starik and Rands, 1995; Starkey and Crane, 2003; Marshall and Brown, 2003).

In a similar vein, interest in organisational change and its management has risen significantly in recent years in parallel to the growing salience of environmental management (By, 2005; Sturdy and Grey, 2003; Van de Ven and Poole, 2005; Wezel and Saka-Helmhout, 2006). A significant body of research has conceptualised organisational change, distinguishing between the content, context and process of organisational change (Armenakis and Bedeian, 1999), identifying types and degrees of change (Van de Ven and Poole, 1995; Armenakis and Bedeian, 1999; Pettigrew *et al.*, 2001; Brown and Eisenhardt, 1997), proposing alternative conceptions of how and why organisations are subject to change (Tsoukas and Chia, 2002; Van de Ven and Poole, 2005) and examining the impact of change on organisational success and survival (Haveman, 1992). This rich conceptual research has, in turn, led to the development of a growing body of empirical research, much of which is qualitative in character and focused upon change within a single, or a small number of organisations engaged in particular activities and industries. For example, empirical research has examined change in the context of US hospitals (Meyer *et al.*, 1990), banks (Fox-Wolfgramm *et al.*, 1998; Haveman, 1992), and airlines and trucking companies (Audia *et al.*, 2000; Kelly and Amburgey, 1991; Miller and Chen, 1994).

These debates within the organisational behaviour literature appear to be of great relevance in this context of explaining and predicting the evolution of corporate environmental strategy. First, ongoing discussions about the origin of organisational (change) behaviour revolve around whether this is the intentional outcome of managerial leadership as part of an organised strategy planning and implementation process, versus a growing number of proponents that argue for a broader view of conceptualising emerging organisational behaviour as the synergistic result of the interaction of individuals at different levels of the organisation (Burgelman, 1991; Floyd and Wooldridge, 1997; Kjærgaard and Kautz, 2008). Second, research on evolutionary processes has evoked widespread arguments in how far they can or should be studied from the perspective of either an individual firm or a population of firms. In particular, discords have arisen where scholars argue for the ability of firms to adapt to a changing environment as opposed to those that view evolutionary selection as the sole arbiter of causing variation among a population of firms (*cf.* Dooley, 1997; Kelly and Amburgey, 1991; Levinthal, 1991; Stacey, 1995). As a result, many scholars claim that organisational behaviour characteristically displays only one of the following types of patterns, inertia (Boeker, 1989; Hannan and Freeman, 1984; Huff *et al.*, 1992; Miller and Friesen, 1984), gradual adjustment (Child, 1997; Cyert and March, 1963; March, 1981; Miles *et al.*, 1978), or even large-scale reorientations (Gersick, 1991; Romanelli and Tushman, 1994).

At the same time, however, a relatively embryonic paradigm has started to gain a foothold among scholars from both the natural and social sciences. Although philosophically in existence already since the times of ancient Greece, concepts and empirical findings from what is now commonly known as 'complexity theory' have begun to infiltrate and influence thinking in a truly cross-disciplinary manner. The starting point of this theory lies in the growing realisation that traditional 'reductionist' approaches within scientific research, albeit extremely enlightening, valid and useful, may not be sufficient in understanding a range of phenomena that display characteristics which are not solely deducible from the detailed analysis of their parts. Central to complexity theory is thus a desire to bridge the gap between explaining the behaviour of individual parts on the one hand, and being able to make predictions about their common interactive future as a whole on the other (Corning, 2002; Dooley, 1997; Levinthal, 1991; Stacey, 1995, 1996).

1.2 AIM AND OBJECTIVES

Given the gap within the literature on the evolution of corporate environmental strategy, the continuing discussions about the origins and mechanisms behind organisational (change) behaviour, and the growing significance of acknowledging the mutual interdependence between wholes and their parts as conceptualised within a developing complexity theory, the purpose of this thesis is to conduct research into a phenomenon of tremendous importance for our civil society, businesses practitioners, and academic scholars alike. More broadly, the aim is to understand whether firms have actually been making any progress over time with regard to becoming more environmentally friendly in their operational and strategic behaviour. Thereby, the thesis makes several contributions to our knowledge and theory, and has important normative implications for managers, policy makers and other stakeholders as well.

1.2.1 AIM

To study and understand the state and evolution of corporate environmental strategy at different levels of analysis from a complex adaptive systems perspective.

Due to the paucity of empirical literature on the evolution of corporate environmental strategy, this thesis, therefore, provides new empirical evidence and consequently has, at least to some degree, a more exploratory character. Equally, in acknowledgement of the absence of appropriate extant theoretical foundations with respect to the topic as well as its complex circumstances, the scientific inquiry in this thesis follows an approach that is initially driven by specific research questions. To that end, the thesis addresses the following important questions.

1.2.2 RESEARCH QUESTIONS

- What is the general long-term trend of corporate environmental strategy across a population of firms? Have firms become more or less proactive, or have they remained unchanged during the recent decade? Are change patterns dependent on particular years or a particular epoch? How do these findings square with theories of inertia, incremental and gradual adjustment, and sudden, radical changes?

- On the macro-level, how do different individual firms within a population evolve in terms of corporate environmental strategy? Do all firms display the same or different (change) patterns?
- In how far do similarities among firms exist in terms of (change) patterns of corporate environmental strategy? And are they dependent upon industry sector and/or firm size?
- What are the particular drivers of organisational change with respect to corporate environmental strategy over time? Do they reside at field- or at macro-level?
- What contribution do individuals make towards organisational change with respect to corporate environmental strategy? In how far is this organisational behaviour 'top-down', 'middle-outward' or 'bottom-up' driven?
- What other conclusions can be drawn about how environmental strategy contributes towards corporate strategy?

In order to answer these questions, the thesis has the following six objectives.

1.2.3 OBJECTIVES

I) To identify emerging themes and gaps in existing knowledge on the longitudinal development of corporate environmental strategy based on the current theoretical and empirical literature;

II) To develop an organising framework of strategy which
   a. takes into account its dynamic, multi-faceted and systemic nature and causal structure;
   b. allows the meaningful and comprehensive conceptualisation of the evolution of corporate *environmental* strategy;
   c. and, as a result, provides a list of propositions suitable to be addressed within the scope of this thesis;

III) To conduct empirical research to address and test the validity of the organising framework, the conceptualisation and its associated propositions using an appropriate research design, data collection and analytical methods;

IV) To assess whether the findings indicate support for the organising framework, the conceptualisation and its propositions;

V) To gauge the strength of the findings based on the methods employed;

VI) To suggest future research directions.

1.3 OVERVIEW OF THE THESIS

The thesis is structured broadly along the lines of the preceding six research objectives. It starts with the next Chapter 2 within which I review the existing state of knowledge pertinent to corporate environmental strategy. Using a literature survey methodology already applied in the context of corporate social responsibility, Chapter 2 explores both the theoretical and empirical contributions to corporate environmental strategy within the mainstream management literature. The results of this survey suggest that extant empirical research is primarily quantitative, cross-sectional, and employs a relatively narrow focus on particular countries and industries. Theoretical contributions are marked by their disagreements between orthodox, static and partial conceptualisations on the one hand and more systemic and dynamic approaches on the other. In conclusion, Chapter 2 argues that there is a significant gap in our knowledge of understanding the longitudinal development of corporate environmental strategy and thus paves the way for the subsequent chapters.

Chapter 3 draws on the preceding literature review in Chapter 2 by exploring the existing literature on the evolution of corporate environmental strategy in more detail. It begins by looking at several concerns with the current state of knowledge in this regard, and by contrasting them with discussions about the definition and critiques of research on 'corporate strategy', it concludes that, for the purpose of this thesis, a dynamic and multi-faceted conceptualisation is needed. Drawing on complexity theory and by applying a 'complex adaptive systems' perspective, I develop an organising framework which views corporate strategy as self-organising behaviour that emerges as the result of agents interacting with each other and their organisational environment. By exploring one of complexity theory's key concepts of 'rugged fitness landscapes', Chapter 3 then aims to conceptualise how organisations change their environmental strategy as a result of adaptive walks across their changing fitness landscapes. Finally, Chapter 3 elaborates the consequences of such conceptualisation by suggesting six research propositions that this thesis is going to address as part of the empirical research.

Chapter 4 is designed to outline the overall research methodology of the thesis. It starts by describing the general research strategy, which is subdivided into two major studies. The choice of a multi-study, multi-level and multi-methods research design is justified on the basis of previous discussions and conclusions within the literature review (Chapter 2) and the conceptual development (Chapter 3) as well as a desire to overcome

inherent research biases and to take advantage of the complementary characteristics of such an approach. Chapter 4 continues by discussing in greater detail the two studies and their particular sampling and research methods. It also elaborates on the analytical techniques employed and makes due reference to research ethics considerations.

Chapter 5 presents the first of four empirical chapters. Drawing on a cross-sectional semi-structured interview survey with 166 environmental managers and directors from a wide variety of UK firms, it is designed to provide a preliminary assessment and characterisation of the state of environmental strategy in the year 2006. Using a mixed methods approach, it studies the plans, processes, systems and motivations for corporate environmental responsiveness as well as the potential barriers to greater proactive engagement with environmental issues. Among its findings it concludes that most firms display a predominantly 'reactive' posture with regard to environmental management, that is to say, concerns for cutting costs and complying with legislation provide the main motivations. In comparison with earlier research, Chapter 5 suggests that firms have been relatively inert in their environmental strategy over time, and it concludes with remarks about the interpretation of the findings in light of the conceptual development of Chapter 3.

The following two Chapters 6 and 7 are part of the same study conducted around a large secondary database of S&P500 companies in the US. Drawing on environmental ratings from KLD Inc., Chapter 6 provides a broad overview over the longitudinal development of corporate environmental strategies among a sample of large US companies. By computing a single measure of the state of environmental strategy for a particular firm-year, it explores the evolution of firms' environmental responsiveness across the years 1997 to 2006, by investigating the trends both within the overall population of S&P 500 firms and those within a balanced sample of firms that were consistently present for the entire duration of the ten years. The findings suggest that a large proportion of firms have not changed their environmental strategies over time. At the same time, the few changes in environmental strategy that have occurred appear to be small and incremental in nature, and only a few firms have been taking slightly more proactive steps in the last two years under observation.

Despite such widespread inertia the question remains, what exactly is it that has motivated the few firms that have recently made changes? Chapter 7 attempts to explore

this question by employing regression analysis with the same sample as in Chapter 6, this time with a slightly extended time frame of 1991 to 2006. In particular, it analyses whether macro-level firm factors (R&D intensity and the number of environmental shareholder resolutions), and field level macro-economic factors (oil prices and interest rates) play a role in instigating organisational change in terms of corporate environmental strategy. The results indicate that while the firm-level factors had no effect, oil prices and interest rates are significantly associated with changes in companies' environmental strategies over time by influencing their ability to make a profit and survive.

Finally, in Chapter 8, I re-interview a sub-sample of 55 of the original UK companies again at the end of 2008 in order to examine whether and why environmental strategy might have changed. In contrast to the previous three chapters, results from this survey round suggest that, while some firms remain unchanged, more proactive developments in environmental strategy over the period of the last three years have been more widespread. Furthermore, Chapter 8 analyses in how far motivations, individuals and contextual factors can be attributed to three different types of (change) behaviour with regard to environmental strategy.

Chapter 9 summarises the four empirical chapters 5 to 8 and assesses, in how far the research questions have been answered, and whether the conceptual development including the suggested propositions have been corroborated in this thesis. It also proceeds to outline some of the more general findings of the empirical research as a basis for assessing its contributions in Chapter 10. Chapter 9 argues that, given the complex nature of the topic and the absence of extant theoretical foundations, the results of this thesis broadly corroborate the conceptual development of firms as fitness seeking complex adaptive systems. Furthermore, firms change their corporate environmental strategy over time whenever failure to do so would threaten their survival or compromise their ability to improve profitability. However, several limitations and delimitations to the empirical work have to be taken into account.

The final Chapter 10 sums up the main approaches, findings and contributions of the thesis. It reviews the outcomes of the literature survey identified in Chapter 2, reiterates the key arguments proposed in the conceptual development of Chapter 3, and juxtaposes them to the findings of the empirical research Chapters 5 to 8. It also elaborates on the

limitations and delimitations of the thesis referred to in Chapter 9. The implications of the thesis suggest that the research has provided valuable contributions and extensions to the field of environmental strategy, and organisational change and complexity theories. In addition, Chapter 10 proposes several directions for future research, such as some variation in the choice of secondary data and aspects thereof as well as the application of different research methods. Additionally, future research opportunities may exist with respect to better operationalising the corporate environmental strategy dependent variable and the application of the organisational fitness construct to a broad range of management research areas, particularly corporate social responsibility.

The findings of this thesis suggest that the state and evolution of corporate environmental strategy are effectively subordinated to contributing towards firms' fitness, whereby firms mostly attempt to remain profitable and obtain social legitimacy. Even over longer periods of time this behaviour has not changed markedly, except that starting from around 2004 higher levels of oil prices and lower interest rates have spurred more proactive environmental changes among a number of firms. Equally, different motivations, individuals and contextual factors appear to influence the varying patterns of evolution. The thesis fills a gap in the existing literature with respect to the lack of conceptual and empirical contributions about the evolution of corporate environmental strategy by providing new insights into how firms are responding to environmental issues over time and by extending various strands of theory.

1.4 CHAPTER SUMMARY

This first Chapter 1 has set the foundations for the ensuing chapters of this thesis by introducing key elements of the existing literature concerned with corporate environmental strategy. Furthermore, it has highlighted gaps and debates within the wider field surrounding literature on organisational behaviour and evolution. Based on these shortcomings, Chapter 1 provided the motivation for undertaking the research in this thesis and has specified the aim, research questions and several objectives in this regard. Specifically, it has argued that there is a lack of understanding with respect to the longitudinal development of corporate environmental strategy, and that by filling this gap in our knowledge a range of contributions are envisaged. Finally, Chapter 1 has provided a synopsis of each of the following chapters and briefly summarised the main findings of this thesis. The thesis commences with the following literature review in Chapter 2.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

In this Chapter 2, I conduct a review of the character and significance of research concerned with environmental issues within the mainstream management literature while specifically focusing on strategic aspects. In particular, I review the methodologies employed in environmental management research, and analyse the contents in both empirical and theoretical contributions. In so doing, this chapter identifies key articles of current environmental management mainstream research, raises a number of issues concerned with these contributions and discusses possibilities for future work that would extend this research in productive directions. The chapter intends to contribute to the existing literatures by providing a coherent and critical introduction to environmental management as it enters the management mainstream. Furthermore, the aim of the review is to identify new research opportunities or to identify issues and approaches that relate to current research. Since I review only part of the vast literatures associated with environmental management, it is important to recognize that this chapter does not provide an exhaustive review of this literature. Rather, I wish both to identify important empirical and conceptual issues within existing research that offer future opportunities for high-impact future enquiry and to complement earlier research that reviews specific, typically functionally-oriented, domains within the field of environmental management. More specifically, this chapter lays the foundations for the following chapters of this thesis and will be used in Chapter 10 to assess the thesis' contribution. In summary, Chapter 2 has the following three aims:

- To review existing research within the mainstream management literature;
- To evaluate theoretical and empirical contributions and identify shortcomings in methodology and contents;
- To develop a research agenda for this thesis by drawing on existing critiques of research in this field.

This chapter is structured as follows. After a brief introduction to the field of research on environmental management, the following section outlines the methods adopted in identifying and analysing the existing literature. Subsequently, I provide findings in the form of an in-depth analysis of this literature before establishing an agenda for future research this area. A final section concludes.

2.2 THE NATURAL ENVIRONMENT IN ACADEMIC RESEARCH

Managing corporate impacts on the natural environment has gained considerably in salience in recent years (Orsato, 2006; Aragón-Correa and Sharma, 2003; Porter and van der Linde, 1995; Berry and Rondinelli, 1998; FSB, 2004; Hart, 1995; MORI, 2005 Shelton, 1994). This interest is reflected in a dramatic growth in the number and diversity of scholarly and practitioner articles addressing environmental issues within the business and academic press. For example, a keyword search using a leading bibliographical database of business/management publications[1] and inserting the search terms 'environmental' and 'sustainability' returned 15,928 and 2,389 articles respectively in the period since 1990. A number of factors have contributed to the upsurge in interest in environmental management including: the introduction of significant new environmental legislation, regulation and taxation in many countries;[2] moves toward a more comprehensive international response to environmental issues such as climate change; and stronger economic incentives to improve resource efficiency and eliminate waste that have arisen out of the heightened interdependence of the global economy and rapid industrialisation among transition economies such as China and India (The Economist, 2006).

Given the rising importance of issues (e.g., climate change), institutions (e.g., regulators and legislators), interests (e.g., stakeholder pressures), and information (e.g., media exposure of environmental issues) in shaping corporate environmental responses (Baron, 1995, 2001; Rugman and Verbeke, 1998a, 1998b; Porter and van der Linde, 1995) scholars and politicians argue that firms need to manage both their market and non-market strategic contexts in an integrated way so as to achieve sustained competitive advantage (Baron, 2001; European Commission, 2001). This view also resonates with the previously mentioned conceptualisation of corporate environmental strategy proposed by Sharma (2000). As a result, scholars emphasise firms' strategic (and particularly proactive) behaviour in responding to environmental concerns and maintaining commercial competitiveness (Orsato, 2006; Porter and van der Linde, 1995; Reinhardt, 1998).

Nonetheless, in spite, or perhaps because, of the rapid growth in interest in the management of corporate environmental impacts, there have only been two

[1] EBSCO's Business Source Premier database
[2] For example, in the UK, these initiatives include: REACH, WEEE, the Climate Change Levy, and landfill taxation.

comprehensive attempt to provide an overview of this literature to date by Bansal and Gao (2006) and Etzion (2007). While their articles present excellent insights into the diversity of research applied in understanding the different levels on which organisations and the natural environment intersect and interact, they are less concerned with the variety of strategic perspectives and questions involved in firms managing environmental issues. Equally, other earlier research has tended to review discrete domains of environmental management research, usually from the perspective of specific business functions such as marketing (Bhattacharya and Sen, 2004; Peattie, 2001), operations management (Gupta, 1995), supply chain management (Srivastava, 2007), and accounting (e.g., Gray *et al.*, 1995) or from a particular methodological standpoint (e.g., Olsthoorn *et al.*, 2000). These reviews provide valuable insights into the extent and importance of green consumerism, the link between operations management and environmental impacts, the nature of corporate disclosures concerning environmental impacts, and the variety of ways in which business environmental impacts are operationalised in earlier studies. Where earlier reviews touch on aspects of corporate strategic decision-making, they are often highly focused. For example, Rugman and Verbeke (1998a, 1998b) review the literature concerned with the relationship between environmental strategies and a firm's regulatory context. While these reviews tell us a considerable amount about the relationship between the natural environment and some important managerial functions, they are partial and, in particular, tell us relatively little about the relationship between the natural environment and general/strategic management research.

2.3 METHODS

In order to achieve the aims of the literature review, it was necessary to identify relevant contributions to the environmental management field and then to classify and analyse them according to a consistent and replicable method. A variety of approaches to identifying relevant contributions to a literature have been applied in earlier studies, many of which make use of electronically accessible bibliographical databases. Where a field is relatively small and well defined, it is often possible to set out to identify all the contributions that have been made to date (e.g., Gray *et al.*, 1995; Orlitzky *et al.*, 2003). Where a literature is larger, a review is necessarily selective and review strategies include randomly sampling articles from the wider population of studies, sampling along conceptual or methodological lines (e.g., Lengnick-Hall and Lengnick-Hall, 1988; Gardner and Martinko, 1996), comprehensively reviewing all articles published in a

specific journal that is particularly influential within a given field (e.g., Johne and Snelson, 1988), and concentrating on contributions made in the most prestigious journals (Scandura and Williams, 2000; Lockett *et al.*, 2006). In light of the size and diversity of the extant literature, the focus on the breadth of environmental research within the field of mainstream general strategic management, and the desire to focus on the most influential research in the mainstream environmental management literature, I decided to adopt a method similar to that employed by Lockett *et al.* (2006) and Lockett and McWilliams (2005). In the spirit of earlier literature reviews, this approach involves conducting a comprehensive and critical review of contributions published within a set of leading management journals.

More specifically, the first stage of the method adopted selects relevant journals according to their influence, as measured by the impact factor published by the Social Science Citation Index (SSCI). The focus on journals with high impact factors stems from the observation that such journals have proven importance for the future development of disciplines (Stigler *et al.*, 1995). A journal's impact factor is a measure of the frequency with which the 'average article' from a journal has been cited in a particular year or period. Formally, a journal's impact factor is given by the ratio of the number of citations of articles published in the journal in the previous two years to the number of articles published during the previous two years. Following this method, 15 core management journals were defined as: Academy of Management Journal (AMJ), Academy of Management Review (AMR), Administrative Science Quarterly (ASQ), British Journal of Management (BJM), California Management Review (CMR), Harvard Business Review (HBR), Journal of Management (JoM), Journal of Management Studies (JMS), Journal of Business Research (JBR), Journal of International Business Studies (JIBS), Management Science (MS), Organization Science (OSc), Organization Studies (OSt), Organization (Org), and Strategic Management Journal (SMJ). This set of journals comprises both conceptually and empirically oriented publications, US-based journals, and those oriented towards Europe as well as purely academic and 'issues-driven' management practice publications.

Two journals, which could be considered obvious choices in this context, have been excluded. Both 'Business Strategy & the Environment' and 'Organization & Environment' provide excellent contributions to the field and the research topic.

However, I believe that including them would almost be tantamount to reviewing entire journals specifically dedicated to this subject area rather than focusing on key contributions made in the leading general management mainstream publications. Given the overall size of the environmental literature, this review is necessarily partial. The choice to focus on a set of leading general management journals was motivated by a desire to understand the character of environmental research within mainstream academic and practitioner journals and by the aim of targeting the most influential research. This approach is clearly not without problems. It resulted in a list of journals (and ultimately a set of articles) whose academic outlook in the main is biased in the sense that it is focused on strategic, firm-level analysis and hence often related to senior management decision-making processes. This stands in contrast to the myriad of other journals available (but excluded from this survey for reasons of space and focus) whose academic attention is oriented more strongly towards the operational implementation of environmental management processes (e.g., Journal of Cleaner Production, Journal of Environmental Management, Journal of Environmental Quality, International Journal of Environment & Pollution, Environmental Science & Technology, Corporate Environmental Strategy). It is perhaps also wise to emphasise that the mainstream management literature is likely to lag behind such journals that purely specialise in environmental management issues in developing and reflecting new theory and publishing studies reflecting this thesis' themes. In other words, the mainstream journals, being somewhat more conservative by nature, may not (yet) reflect new and emergent thinking in the area. As a result, it is possible that useful answers and information which would allow the ideas developed within this thesis to be taken further may already exist outside the scope of the literature consulted. These caveats should be borne in mind when considering the following results and arguments.

Having established the set of publications from which to review relevant research, the next step requires a determination of the 'relevance' of particular pieces of research. In practice, and in common with many earlier literature reviews, this process requires the selection of a set of keywords with which to search a bibliographic database. The keywords, which were employed to delineate the environmental management domain, were 'environment', 'environmental', 'sustainability', 'sustainable', 'green', 'greening', 'eco', 'ecological', and 'ecology'. Drawing on the EBSCO's Business Source Premier online database, I used these keywords to identify a total of 137 articles for the period 1990–2008 from the fifteen management journals listed above. These articles were

reviewed in detail to determine that the research addressed issues concerned with organisations and the natural environment. Transcribed speeches of roundtable discussions, book reviews, letters to editors, and irrelevant articles (e.g., those not regarding the 'natural' environment) were excluded from the analysis. Of the 137 articles, 101 were published in the thirteen academic management journals, while 36 papers were published in the two practitioner-oriented journals. Bearing in mind the ratio of the two types of journals, this demonstrates that environmental management is of similarly great importance to both scholars and practitioners.

The 137 articles identified were then analysed through a detailed examination of the focus, topic, conceptual and methodological approach of each individual study. I first classified papers as being either empirical or theoretical in orientation. Subsequently, I determined the research focus of the articles by examining the research question investigated in addition to keywords in the title and abstract. The empirical papers were sub-divided into quantitative and qualitative types (or mixed methods), while the theoretical papers were grouped into purely theoretical, theoretical/anecdotal, or other. Given the high quality pool of journals selected, there was an expectation that empirical contributions would have been theoretically informed and may even have made theoretical contributions. Moreover, many empirical and non-normative papers might have been inspired by normative questions. Thus, many papers could include quantitative, qualitative, normative and non-normative theoretical elements. The intention was simply to distinguish the main approach or contribution of each paper. Categorisations were made on the basis of the judgement of the author who classified each paper.

2.4 FINDINGS

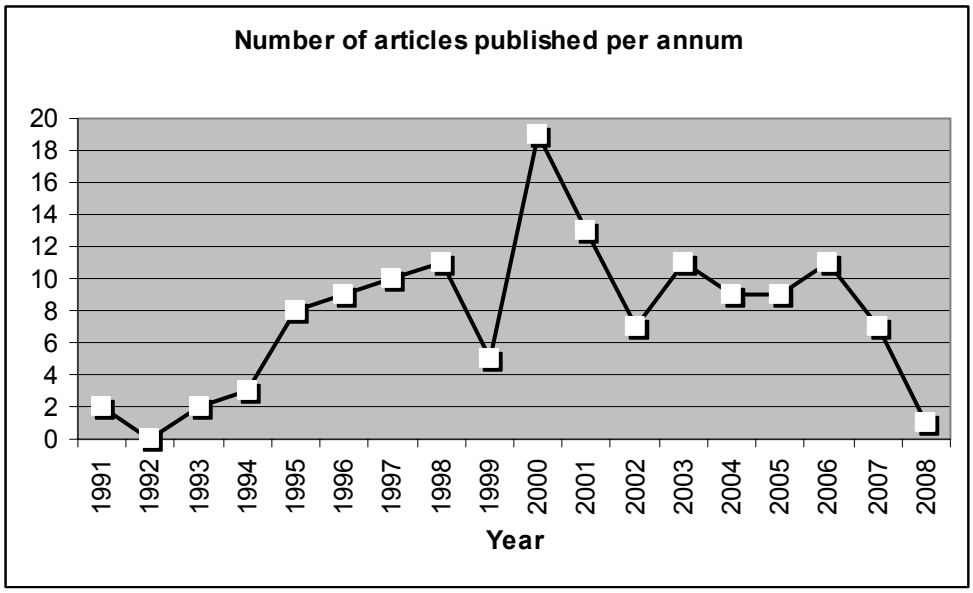
This section evaluates existing research concerning environmental issues within the management mainstream. I begin with a review of the methodologies employed in empirical work before providing a detailed overview of the range of issues explored in theoretical contributions, and finally discussing the key findings of earlier studies. Figures 1 and 2, below, describe the distribution of articles by journal and by year, respectively, over the period 1991-2008. It is noticeable that publications are very unevenly distributed across the journals with the Academy of Management Journal, California Management Review, Harvard Business Review, Journal of Business

Research, and Strategic Management Journal collectively publishing together some 88 articles (64%).

Figure 1: The incidence of journal articles addressing environmental issues during the period 1990-2008, disaggregated by journal title

Journal Title		#
Academy of Management Journal	**AMJ**	**22**
Academy of Management Review	**AMR**	**10**
Journal of Management Studies	**JMS**	**9**
Journal of Business Research	**JBR**	**14**
Journal of Management	**JoM**	**2**
Administrative Science Quarterly	**ASQ**	**0**
Organization Studies	**OSt**	**10**
Organization Science	**OSc**	**2**
Strategic Management Journal	**SMJ**	**16**
Harvard Business Review	**HBR**	**16**
British Journal of Management	**BJM**	**4**
Journal of International Business Studies	**JIBS**	**2**
Organization	**Org**	**4**
California Management Review	**CMR**	**20**
Management Science	**MS**	**6**
Total		**137**

Figure 2: Pattern of aggregate annual number of articles published on natural environmental issues in selected management journals



The following Figures 3 and 4 afford a chronological overview of the literature both in terms of empirical (Figure 3) and theoretical (Figure 4) research. Interestingly, while theoretical contributions have been published as early as 1991, empirical research in this

set of journals does not appear before 1996. This would suggest that theoretical and normative debates preceded empirical studies in the management mainstream for quite some time. At the same time, the apparent recent decline in publications in mainstream management journals is a worrying trend, which stands in stark contrast to the heightened political interest and scientific urgency in addressing environmental issues within the corporate sphere.

Figure 3: Timeline of empirical research

1996	Klassen & McLaughlin	Management Science 42(8): 1199-1214
	Fineman & Clarke	Journal of Management Studies 33(6): 715-730
	Carlson *et al.*	Journal of Business Research 37(3): 225-232
	Lamming & Hampson	British Journal of Management 7(1): S45-S62
	Nehrt	Strategic Management Journal 17(7): 535-547
	Florida	California Management Review 39(1): 80-105
	Fineman	Organization Studies 17(3): 479-501
	Roberts	Journal of Business Research 36(3): 217-231
1997	Russo & Fouts	Academy of Management Journal 40 (3): 534-559
	Minton & Rose	Journal of Business Research 40(1): 37-48
	Fineman	British Journal of Management 8(1): 31-39
	Roberts & Bacon	Journal of Business Research 40(1): 79-89
1998	Aragón-Correa	Academy of Management Journal 41(5): 556-567
	Judge & Douglas	Journal of Management Studies 35(2): 241-262
	Fineman	Organization Studies 19(6): 953-974
	Sharma & Vredenburg	Strategic Management Journal 19(8): 729-754
1999	Henri & Sadorsky	Academy of Management Journal 42(1): 87-99
	Klassen & Whybark	Academy of Management Journal 42(6): 599-615
	Hoffman	Academy of Management Journal 42(4): 351-371
2000	Tenbrunsel *et al.*	Academy of Management Journal 43(5): 854-866
	Andersson & Bateman	Academy of Management Journal 43(4): 548-570
	Egri & Herman	Academy of Management Journal 43(4): 571-604
	Ramus & Steger	Academy of Management Journal 43(4): 605-626
	Cordano & Frieze	Academy of Management Journal 43(4): 627-641
	Flannery & May	Academy of Management Journal 43(4): 642-662
	Christmann	Academy of Management Journal 43(4): 663-680
	Sharma	Academy of Management Journal 43(4): 681-697
	Bansal & Roth	Academy of Management Journal 43(4): 717-736
	Whiteman & Cooper	Academy of Management Journal 43(6): 1265-1282
	Mathur & Mathur	Journal of Business Research 50(2): 193-200
	Gilley *et al.*	Journal of Management 26(6): 1199-2017
	Crane	Organization Studies 21(4): 673-697
	Howard *et al.*	California Management Review 42(2): 63-82
	Winn & Angell	Organization Studies 21(6): 1119-1148
	Dowell *et al.*	Management Science 46(8): 1059-1075
	King & Lenox	Academy of Management Journal 43(4): 698-716
2001	Lewis & Harvey	Journal of Management Studies 38(2): 201-233
	McKay	Organization Studies 22(4): 625-659
	King & Shaver	Strategic Management Journal 22(11): 1069-1086
	Christmann & Taylor	Journal of International Business Studies 32(3): 439-459
	Florida & Davison	California Management Review 43(3): 64-84
	Ramus	California Management Review 43(3): 85-105
2002	Halme	Journal of Management Studies 39(8): 1087-1109
	Kilbourne *et al.*	Journal of Business Research 55(3): 193-204
	Kassinis & Vafeas	Strategic Management Journal 23(5): 399-415

	Orsato *et al.*	Organization Studies 23(4): 639-665
	Bowen	British Journal of Management 13 (4): 305-316
2003	Rothenberg	Journal of Management Studies 40(7): 1783-1802
	Pujari *et al.*	Journal of Business Research 56(8): 657-672
	Bansal	Organization Science 14(5): 510-527
	Buysse & Verbeke	Strategic Management Journal 24(5): 453-471
	Russo	Strategic Management Journal 24(4): 317-332
	Thornton *et al.*	California Management Review 46(1): 127-141
	Diamantopoulos *et al.*	Journal of Business Research 56(6): 465-481
2004	Christmann	Academy of Management Journal 47(5): 747-760
	Bansal & Clelland	Academy of Management Journal 47(1): 93-103
	Aragón-Correa *et al.*	Journal of Business Research 57(9): 964-975
	Branzei *et al.*	Strategic Management Journal 25(11): 1075-1095
	Geyer & Jackson	California Management Review 46(2): 55-73
	Lenox & King	Strategic Management Journal 25: 331-345
2005	Russo & Harrison	Academy of Management Journal 48(4): 582-593
	Child & Tsai	Journal of Management Studies 42(1): 95-125
	Judge & Elenkov	Journal of Business Research 58(7): 893-901
	González-Benito & González-Benito	British Journal of Management 16(2): 133-148
	Sharma & Henriques	Strategic Management Journal 26(2): 159-180
	Bansal	Strategic Management Journal 26(3): 197-218
	King *et al.*	Academy of Management Journal 48(6): 1091-1106
2006	Kassinis & Vafeas	Academy of Management Journal 49(1): 145-159
	Clemens & Douglas	Journal of Business Research 59 (4): 483-491
	Clemens	Journal of Business Research 59(4): 492-500
	Roome & Wijen	Organization Studies 27(2): 235-263
	Darnall & Edwards	Strategic Management Journal 27(4): 301-320
	Crotty	Organization Studies 27(9): 1319-1338
	Boström	Organization 13(3): 345-367
2007	Schaefer	Journal of Management Studies 44(4): 506-535
	Rothenberg	Journal of Business Research 60(7): 749-757
	Boiral	Organization Science 18(1): 127-146
	Delmas *et al.*	Strategic Management Journal 28(2): 189-209
2008	Scharfman & Fernando	Strategic Management Journal 29: 569-592

Figure 4: Timeline of theoretical research

1991	Stern	Harvard Business Review 69(3): 14-29
	Kleiner	Harvard Business Review 69(4): 38-47
1993	Corbett & Van Wassenhove	California Management Review 36(1): 116-135
	Biddle	Harvard Business Review 71(6): 145-156
1994	Shrivastava	Organization Studies 15(5): 705-727
	Walley & Whitehead	Harvard Business Review 72(3): 46-51
	Elkington	California Management Review 36(2): 90-100
1995	Shrivastava	Academy of Management Review 20(4): 936-960
	Gladwin & Kennelly	Academy of Management Review 20(4): 874-907
	Starik & Rands	Academy of Management Review 20(4): 908-935
	Jennings & Zandbergen	Academy of Management Review 20(4): 1015-1052
	King	Academy of Management Review 20(4): 961-985
	Porter & van der Linde	Harvard Business Review 73(5): 120-134
	Shrivastava	Strategic Management Journal 16 (5): 183-200
	Schoemaker & Schoemaker	California Management Review 37(3): 29-61
1996	Rondinelli & Vastag	California Management Review 39(1): 106-122
1997	Newton & Harte	Journal of Management Studies 34(1): 75-98
	Hart	Harvard Business Review 75(1): 66-76
	Landry	Harvard Business Review 75(4): 10-11
	Magretta	Harvard Business Review 75(1): 78-88

	Levy	California Management Review 39(3): 54-71
	Maxwell *et al.*	California Management Review 39(3): 118-134
1998	Nehrt.	Academy of Management Review 23(1): 77-97
	Rugman & Verbeke	Strategic Management Journal 19(4): 363-376
	McGee	Strategic Management Journal 19(4): 377-388
	Rugman & Verbeke	Journal of International Business Studies 29(4): 819-833
	Cortazar & Schwartz	Management Science 44(8): 1059-1070
	Champion	Harvard Business Review 76(6): 20-21
	Reinhardt	California Management Review 40(4): 43-73
1999	Reinhardt	Harvard Business Review 77(4): 149-158
	Reilly	California Management Review 41(4): 17-26
2000	Starik & Marcus	Academy of Management Journal 43(4): 539-547
	Kolk	Harvard Business Review 78(1): 15-16
2001	Rosen	California Management Review 43(3): 8-15
	Delmas & Terlaak	California Management Review 43(3): 44-63
	Fineman	Organization 8(1): 17-32
	Chen	Management Science 47(2): 250-264
	Corbett & DeCroix	Management Science 47(7): 881-894
	Holliday	Harvard Business Review 79(8): 129-132
	Preston	California Management Review 43(3): 26-37
2002	Newton	Academy of Management Review 27(4): 523-540
	Schendler	Harvard Business Review 80(6): 28-29
2003	Aragón-Correa & Sharma	Academy of Management Review 28(1): 71-88
	Starkey & Crane	Academy of Management Review 28(2): 220-237
	Banerjee	Organization Studies 24(1): 143-180
	Marshall & Brown	California Management Review 46(1): 101-126
2004	Fuller & Ottman	Journal of Business Research 57(11): 1231-1238
	Raemoe	Organization 11(6): 849-872
	Levi & Nault	Management Science 50(8): 1015-1030
2005	Prasad & Elmes	Journal of Management Studies 42(4): 845-867
	Hoffman	California Management Review 47(3): 21-46
2006	Orsato	California Management Review 48(2): 127-143
	Milne *et al.*	Organization 13(6): 801-839
	McDonough	Harvard Business Review 84(2): 38-39
	White	Harvard Business Review 84(3): 27-28
2007	King	Academy of Management Review 32(3): 889-900
	Schendler	Harvard Business Review 85(10): 35-38
	Etzion	Journal of Management 33(4): 637-664

2.4.1 RESEARCH METHODS IN EXISTING EMPIRICAL ENVIRONMENTAL RESEARCH

This section explores the methods employed in empirical environmental management mainstream research. Principally, the focus lies on the nature of research including approaches to sampling, respondent identification, and measurement. Figure 5 provides an overview of the balance of the empirical literature between qualitative and quantitative approaches and an insight into the role played by time in earlier research. Generally speaking, the empirical literature uses predominantly quantitative research methods, with a particular emphasis on questionnaire surveys, usually of corporate managers (e.g., Aragón-Correa, 1998; Aragón-Correa *et al.*, 2004; Andersson and

Bateman, 2000; Bansal, 2005; Branzei *et al.*, 2004; Buysse and Verbeke, 2003; Child and Tsai, 2005; Clemens, 2006). Other significant quantitative methods make use of secondary data sources (Russo, 2003), or survey the attitudes of graduate students, non-faculty university staff (Kilbourne *et al.*, 2002; Tenbrunsel *et al.*, 2000; Minton and Rose, 1997) and other random individuals (Diamantopoulos *et al.*, 2003; Roberts, 1996; Roberts and Bacon, 1997). A wide variety of secondary sources are explored in empirical studies including media reports and stock prices (Bansal and Clelland, 2004; Klassen and McLaughlin, 1996; Mathur and Mathur, 2000), environmental advertisements in newspapers, magazines, and other journals (Carlson *et al.*, 1996), firms' announcements of environmental initiatives in the Wall Street Journal (Gilley *et al.*, 2000), the Environmental Protection Agency's Toxic Release Index in the U.S.A. (Kassinis and Vafeas, 2006; King and Lenox, 2000; King and Shaver, 2001; King *et al.*, 2005; Lenox and King, 2004; Scharfman and Fernando, 2008), Dun and Bradstreet's census (González-Benito and González-Benito, 2005; Russo and Harrison, 2005), the National Database of Environmental Management Systems (Darnall and Edwards, 2006), the Enforcement and Compliance Assurance Accomplishments Reports (Kassinis and Vafeas, 2002), the 1998 Harris Directory of manufacturing plants in Pennsylvania (Florida and Davison, 2001), Westlaw's environmental law database (Hoffman, 1999), corporate environmental profiles from the Investor Responsibility Research Center (IRRC) (Dowell *et al.*, 2000), firms participating in the 'Duales System Deutschland' (Winn and Angell, 2000), and firms listed on various Standard and Poor Indices (Florida, 1996).

Figure 5: Empirical research methods and research strategies

Research methods	Research strategies
▪ Quantitative (52)	▪ Cross-sectional (68)
▪ Qualitative (21)	▪ Longitudinal (11)
▪ Mixed (6)	

NB: number in brackets indicates number of articles

Approximately a quarter of all empirical studies in this review are based on qualitative research methods such as (mostly semi-structured) interviews, usually drawing on smaller samples than corresponding quantitative work. Examples of this sort of research include Bansal and Roth (2000) who interviewed senior and environmental managers, Child and Tsai (2005) who interviewed plant level or regional managers, firm senior

managers, plant HSE managers, Fineman (1997) who conducted interviews with 37 managers in six international automotive firms and observed the participants during work, Halme (2002) who interviewed senior executives, middle management and employees, and Orsato *et al.*'s (2002) interviews with key players in various governments and industries. Alternative qualitative research approaches present in the literature entail ethnographic studies, which were designed in the form of participant and field observation; for example, Whiteman and Cooper (2000) among the Cree tallymen of Eastern James Bay in Canada, Fineman's (1998) work-shadowing of Environmental Agency inspectors, and Bansal and Roth's (2000) recording of observations among environmental managers. Six studies combine both qualitative and quantitative research methods, among them Sharma and Vredenburg (1998) who carried out case studies and a mail survey of seven firms in the oil and gas industry, Thornton *et al.* (2003) who conducted on-site, semi-structured interviews with environmental managers in 14 timber and pulp mills as well as analysing their environmental performance through indicators such as biological oxygen demand, total suspended solids, AOX and chemical spills. Other studies using the mixed methods approach are Hoffman (1999), Howard *et al.* (2000), Ramus (2001), and Winn and Angell (2000).

The vast majority of studies employ a cross-sectional research method. Such a technique offers a snapshot of environmental management practice at particular points in time but sheds very little light on the evolving pattern of management practice, or the processes that are involved with improving environmental impacts. A few notable exceptions of research with longitudinal character exist. For example, 1-year (Bansal, 2003); 18-months (Sharma and Vredenburg, 1998; Whiteman and Cooper, 2000); 2-year (Russo and Fouts, 1997; Schaefer, 2007); 3-year (Darnall and Edwards, 2006); 5-year (Bansal and Clelland, 2004; Nehrt, 1996); 10-year (Bansal, 2005; Orsato *et al.*, 2002), and a 33-year period (Hoffman, 1999).

Figure 6, below, shows significant sample characteristics of research contained in this literature survey. Commonly, existing research adopts a sampling strategy that involves selecting samples from particular industries, especially those most closely associated with higher environmental impacts. Given the importance of institutional, especially regulatory, forces as stimuli for corporate environmental responses, this strategy is puzzling since samples drawn from particular industries exhibit a narrower range of variability in the nature and degree of such pressures. For example, Christmann (2000,

2004), Hoffman (1999), Howard *et al.* (2000), King and Lenox (2000), Nehrt (1996), and Roome and Wijen (2006) study companies in the chemicals industry, while Boiral (2007), Cordano and Frieze (2000), Dowell *et al.* (2000), Florida (1996), Florida and Davison (2001), González-Benito and González-Benito (2005), Judge and Elenkov (2005), Kassinis and Vafeas (2006), King *et al.* (2005), King and Shaver (2001), Klassen and Whybark (1999), Lenox and King (2004), and Pujari *et al.* (2003) all explore manufacturing firms. Others examine the metals industry (e.g., Clemens, 2006; Clemens and Douglas, 2006; Flannery and May, 2000; Kassinis and Vafeas, 2006), the petrochemical sector (Sharma, 2000; Sharma and Vredenburg, 1998), the forestry (Boiral, 2007; Bostroem, 2006; Halme, 2002; McKay, 2001; Sharma and Henriques, 2005), or the electronics industry (Russo and Harrison, 2005). In contrast, a variety of industries are included in the samples of research by Aragón-Correa (1998), Aragón-Correa *et al.* (2004), Bansal and Clelland (2004), Bowen (2002), Branzei *et al.* (2004), Buysse and Verbeke (2003), Fineman and Clarke (1996), Gilley *et al.* (2000), Judge and Douglas (1998), Klassen and McLaughlin (1996), Russo and Fouts (1997), and Scharfman and Fernando (2008).

Figure 6: Significant sample characteristics

Geographic focus	Industry sector	Firm size focus	Level of analysis	Unit of analysis
U.S.A. (41)	Various (22)	Large (35)	Firm (46)	Environmental managers & directors (19)
U.K. (15)	Chemicals (12)	SME & Large (21)	Plant (12)	Plant/operations manager (14)
Canada (12)	Manufacturing (12)	SME (5)	Individual (9)	Senior executives (10)
	Forestry (6)		Firm & plant (5)	Middle managers (10)
	Petrochemicals (5)		Business unit (2)	Low-level employees (10)
	Metals/steel (5)		One nation / firm (66)	Random individuals (3)
	Automotive (4)		Cross-country (4)	Head of Business Unit (2)

NB: number in brackets indicates number of articles

A consequence of the largely industry focused sampling approach is the great variance in terms of both sample size and the size of sample companies. Indeed, sample sizes vary greatly across the 79 empirical studies in this review. The overall average number of observations for all empirical studies is 432 with a range stretching from 2 up to 7,899 sample units. The average sample sizes for qualitative and quantitative studies

are 36 and 517, respectively. Regarding the size of sample firms, research typically focuses on large firms. For example, Aragón-Correa (1998), Bansal and Clelland (2004), Bowen (2002), Christmann (2004), Delmas *et al.* (2007), Dowell *et al.* (2000), Fineman (1996), Kassinis and Vafeas (2006), Klassen and McLaughlin (1996), Rothenberg (2007), Russo and Harrison (2005), Schaefer (2007), Scharfman and Fernando (2008) all analyse exclusively large companies. However, it is very difficult to ascertain that the final samples contain solely large firms; two exceptions are González-Benito and González-Benito's (2005) work (effective average firm size amounts to 420 employees) and Aragón-Correa's (1998) research in which it is possible to confirm effective average sample firm sizes, in the latter case an average of 3,610 employees with average sales of $1,074bn. Two studies look at environmental issues in small firms only (Clemens, 2006; Flannery and May, 2000). Quite frequently studies are also investigating combined samples of either large and medium sized companies (Branzei *et al.*, 2004; Buysse and Verbeke, 2003; Christmann and Taylor, 2001: below 50 employees to more than 5,000 employees; Kassinis and Vafeas, 2002; Sharma and Henriques, 2005; Sharma and Vredenburg, 1998: from 400 to 10,000 employees; C$0.1bn to C$10bn assets; Thornton *et al.*, 2003). Another combination contains large, medium and small firms all together, such as Darnall and Edwards (2006) with publicly traded firms having on average 736 employees, privately traded firms having on average 320 employees, government owned firms having on average 258 employees; Florida (1996); Judge and Douglas (1998) firms with 20 to 430,000 employees, a mean of 19,902 employees and on average $73bn assets; Judge and Elenkov (2005) 10 small firms, 17 medium firms, 4 large firms; King and Shaver (2001); Lewis and Harvey (2001) from 1-9 employees to more than 50,000 employees, from £0.5m to more than £1,000m annual turnover; and Pujari *et al.* (2003) from less than 50 employees to more than 1,500 employees, with less than $50m to more than $1,500m turnover sales.

The geographical distribution of samples analysed in the reviewed studies is highly skewed towards Northern America and the UK (see Figure 6). Single-country studies based in these geographic contexts account for over 85% of existing empirical work. However, there are exceptions to these observations, such as, for example, studies exploring environmental issues in Finland (Halme, 2002), Belgium (Buysse and Verbeke, 2003), Bulgaria (Judge and Elenkov, 2005), Germany, France and Italy (Orsato *et al.*, 2002), Russia (Crotty, 2006), and Sweden (Bostroem, 2006). In addition to the overwhelming majority of cases that scrutinise firms within a single country

setting, four exceptions to this rule observe firms from a cross-country perspective, namely China and Taiwan (Child and Tsai, 2005), U.S.A. and Japan (Florida, 1996; Rothenberg, 2003), and U.S.A. and Canada (Rothenberg, 2007).

Further observations on the characteristics of empirical work concern the nature of the unit of analysis explored in earlier research and the nature of research subjects under investigation. Given the importance of embedding sound environmental practices for the development of effective environmental strategies, it is perhaps surprising that existing research in the mainstream predominantly explores the management of environmental issues at one point within a firm, usually at the level of the plant (e.g., Cordano and Frieze, 2000; Darnall and Edwards, 2006; Kassinis and Vafeas, 2006; King *et al.*, 2005; King and Shaver, 2001; Klassen and Whybark, 1999; Rothenberg, 2003; Russo and Harrison, 2005), or head office (e.g., Bansal, 2005; Buysse and Verbeke, 2003; Christmann, 2000, 2004; Christmann and Taylor, 2001). Rarely, studies explore a combination of both firm and plant level (Child and Tsai, 2005; Halme, 2002; King and Lenox, 2000; Lenox and King, 2004) and only a few isolated cases explore environmental management at the level of the individual project (Russo, 2003), or of a single industry (Geyer and Jackson, 2004; Hoffman, 1999). Reflecting the general approach of selecting a single unit of analysis, research tends to record the opinions, perceptions and attitudes of those involved in senior management or those directly involved with managing environmental issues. Respondents in existing research include senior management executives (e.g., Christmann and Taylor, 2001; Lewis and Harvey, 2001) or CEO/Managing Director specifically (e.g., Aragón-Correa, 1998; Christmann, 2000, 2004; Egri and Herman, 2000; Winn and Angell, 2000), environmental directors (Bansal and Roth, 2000; Judge and Douglas, 1998; Pujari *et al.*, 2003), environmental managers (e.g., Cordano and Frieze, 2000; Flannery and May, 2000; Russo and Harrison, 2005; Sharma, 2000; Henriques and Sadorsky, 1999; Lenox and King, 2004), environmental champions (Andersson and Bateman, 2000; Crane, 2000b), middle managers and low-level employees (e.g., Ramus and Steger, 2000), but also general stakeholders (Kassinis and Vafeas, 2006), environmental regulators (Fineman, 1998), and government and industry officials (Orsato *et al.*, 2002).

Finally, with regard to firm or plant environmental performance, several types of measurements have been applied. Examples entail toxic emissions released as compiled by the Toxic Release Index (Cordano and Frieze, 2000; Kassini and Vafeas, 2006;

Russo and Harrison, 2005), reported arsenic emissions levels (Tenbrunsel *et al.*, 2000), environmental ratings assigned by Franklin Research and Development Corporation (FRDC) (Russo and Fouts, 1997), by Kinder, Lydenberg, Domini & Co., Inc. (KLD) (Scharfman and Fernando, 2008), or profiles from the Investor Responsible Research Center (IRRC) (Dowell *et al.*, 2000), environmental awards and crises (Klassen and McLaughlin, 1996), and the 'setting up of environmental projects' including type of change, pollutant medium, and level of worker involvement (Rothenberg, 2003). Another study relied on archival data from the Bulgarian Ministry of Environment including the degree of maintenance, conservation and expansion of environmental resources; degree of maintenance of the vitality of ecosystems; degree of maintenance and increase in the production functions of the ecosystems; and degree of maintenance and improvement of the socioeconomic functions and conditions (Judge and Elenkov, 2005). Clemens (2006) used a Likert scale to allow respondents the rating of the extent to which they agreed that their firm's green program improved green performance in comparison to their competitors, while Thornton *et al.* (2003) examined detailed histories of particular environmental actions within the facilities as well as measures of water pollutants such as biological oxygen demand, total suspended solids, AOX, and chemical spills. Florida and Davison (2001) collected data and information about plants' community environmental activities, their modes of information sharing, mechanisms for obtaining community input on environmental priority setting and information sharing, and their community environmental impacts (e.g., waste and emission streams, noise, odour, and employment).

Economic performance is measured either in the form of changes in share price (Bansal and Clelland, 2004; Klassen and McLaughlin, 1996; Mathur and Mathur, 2000), return on assets (ROA) (Russo and Fouts, 1997), weighted average cost of capital (WACC) (Scharfman and Fernando, 2008), or Tobin's *q* (Dowell *et al.*, 2000). Clemens (2006) developed a more comprehensive approach by devising a five-question construct which asked respondents to compare their firms against their competitors with respect to growth in earnings, growth in revenue, change in market share, return on assets, and long run level of profitability.

2.4.2 CONCEPTUAL THEMES IN EXISTING RESEARCH

This section identifies and discusses the major issues and conceptual themes within existing research. A general initial observation is that the literature addresses a very

heterogeneous and wide-ranging set of research questions that reflect the diversity of the strategic challenges posed by environmental issues. Consistent with this, examples stem from most of the major business fields including finance, marketing, operations management, human resources management and strategy.

Examples of conceptual approaches applied to environmental management are the resource-based view of the firm (RBV) (Clemens and Douglas, 2006), the natural resource-based view of the firm (NRBV) (Aragón-Correa and Sharma, 2003; Judge and Douglas, 1998; Hart, 1997), resource dependence theory (Kassinis and Vafeas, 2006; McKay, 2001), institutional theory (Bansal and Clelland, 2004; Boiral, 2007; Buysse and Verbeke, 2003; Clemens and Douglas, 2006; Delmas *et al.*, 2007; Hoffman, 1999; Howard *et al.*, 2000; Rothenberg, 2007; Schaefer, 2007), stakeholder theory (Buysse and Verbeke, 2003; Kassinis and Vafeas, 2002), transaction cost theory (King, 2007), congruence theory (Russo and Harrison, 2005), strategic issue interpretation (Sharma, 2000), corporate governance theory (Kassinis and Vafeas, 2002), issue identification and issue-selling literature (Bansal, 2003), organisational change literature (Judge and Elenkov, 2005), Ajzen's theory of planned behaviour (Cordano and Frieze, 2000; Flannery and May, 2000), Jones's moral intensity construct (Flannery and May, 2000), Schwartz' model of altruistic behaviour (Minton and Rose, 1997), the dominant social paradigm model (Kilbourne *et al.*, 2002), control and goal theory (Branzei *et al.*, 2004), organisational learning (Roome and Wijen, 2006), theories of absorptive capacity (Lenox and King, 2004), first-mover and sustainable advantage literature (Nehrt, 1996), risk management (Scharfman and Fernando, 2008), escalation of commitment (Branzei *et al.*, 2004), organizational reputation framework (Gilley *et al.*, 2000), political ecology framework (Orsato *et al.*, 2002), and using the social constructionists' approach (Fineman, 1997).

Theoretical contributions. The extant theoretical literature included in this survey can usefully be characterised as being either eco-centric or econo-centric in its worldview. The latter delineation is a slightly adapted and broadened version of the commonly labelled 'techno-centric' paradigm used by many authors. It includes a general market-based and capitalist perspective in addition to the reliance on technological change and progress. Figure 7, below, affords examples of some of the most predominant theories and themes applied in each category.

Figure 7: Key theories and themes applied and developed in the eco-centric and econo-centric theoretical literatures

Econo-centric	Eco-centric
▪ Institutional theory (Rugman & Verbeke 1998b; Delmas & Terlaak 2001) ▪ RBV of the firm (Rugman & Verbeke 1998a) ▪ Contingent RBV of the natural environment (Aragón-Correa & Sharma 2003) ▪ Environmental supply chain management (Champion 1998; Corbett & DeCroix 2001) ▪ Environmental input/output analysis (EIO) (Landry 1997) ▪ Environmental reporting (Kolk 2000) ▪ Pollution-reduction paradigm (Nehrt 1998) ▪ Environmentally sustainable development (Shrivastava 1995a) ▪ Interdependency network perspective (Newton 2002) ▪ Green evangelism (Newton 1997) ▪ Sustainable product design (Chen 2001; Fuller & Ottman 2004) ▪ Sustainability (Hart 1997) ▪ Transaction costs (King 2007) ▪ Environmental investments (Cortazar & Schwartz 1998; Levi & Nault 2004)	▪ Institutional theory (Jennings & Zandbergen 1995) ▪ Ecological sustainability (Starik & Rands 1995) ▪ Evolutionary epic (Starkey & Crane 2003) ▪ Ecosystem dynamics (King 1995) ▪ Practical environmental management (Prasad & Elmes 2005) ▪ Sustainable development (Banerjee 2003) ▪ Sustainability (Milne *et al.* 2006)
▪ Economic biosphere (Shrivastava 1994) ▪ Corporate greening (Fineman 2001) ▪ Sustainability (Marshall & Brown 2003; Reilly 1996) ▪ Sustaincentrism (Gladwin & Kennelly 1995)	

A significant body of the more econo-centric research focuses on sustainable development – a concept that has gained enormously in importance during the last 20 years – with a particular emphasis on taxonomies of environmental management strategies. Much of this research aims to describe not only what firms are already doing, but rather prescribe what they should be doing in order to achieve ecological sustainability (Shrivastava, 1995a). For example, Hart (1997) argues that 'the challenge is to develop a sustainable global economy: an economy that the planet is capable of supporting indefinitely' (Hart, 1997: 67). The promotion of sustainability stretches beyond traditional environmental protection (often framed in terms of risk reduction, reengineering, or cost cutting) and acknowledges instead that the global economy

consists of a market economy, a survival economy and nature's economy (Hart, 1997). Important issues are: 'Managing the impacts of populations on ecosystems; ensuring worldwide food security; managing ecosystem resources; and creating sustainable economies' (Shrivastava, 1995a: 938-941). By using institutional theory, this branch of the environmental management literature examines which role corporations play in delivering sustainability as demanded by governments, non-governmental organisations and civil citizens around the world. It highlights that the concept of sustainability reflects the complex interaction between social and ecological systems, which requires foresight and action in 'order to remain intact over long periods of time' (Jennings and Zandbergen, 1995: 1018). But it also argues that a single organisation on its own cannot become sustainable; rather the aggregate mix of organisations contributes to the large system in which sustainability may or may not be achieved (Jennings and Zandbergen, 1995: 1023).

Hart (1997) highlights that 'achieving sustainability will require stabilising or reducing the environmental burden. That can be done by decreasing the human population, lowering the level of affluence (consumption), or changing fundamentally the technology used to create wealth' (Hart, 1997: 69). The role of corporations in this equation is therefore heavily geared towards technological innovation and development. This requires vision and senior management decisions that link corporate activities to the 'fundamental problems of sustainability (i.e., the ecological impacts of population, food security, ecosystem preservation, energy use, and technological change) through the adoption of sustainable strategies at enterprise, corporate, business and functional levels' (Shrivastava, 1995a: 954).

This, often evangelical (Newton and Harte, 1997) and practical (Prasad and Elmes, 2005a) sounding literature is in return criticised by many scholars who believe that the concept of sustainability has been misinterpreted or abused. The critical view of sustainability entails a fundamental conflict between two antithetical paradigms: 'techno-centricism' and 'eco-centricism'. Yet, at the same time, Newton (2002) bemoans a certain naivety of the eco-centric paradigm by claiming that it does not take into account the sheer complexity and interdependency of natural and social processes. He also questions the determined belief by many scholars in the assumption that companies will voluntarily want to become greener (Newton and Harte, 1997). Others argue that neither paradigm is sufficient and useful (Banerjee, 2002) and instead pin

their hope on a merged paradigm of 'sustaincentrism' in order to transform management theory and research in support of sustainable development (Gladwin and Kennelly, 1995; Starkey and Crane, 2003). For many, current management and organisational research is still too dominated by economic concerns (Banerjee, 2003), favours pragmatism and convenience (Prasad and Elmes, 2005a) and neglects the natural environment in its reasoning (Shrivastava, 1994). Additionally, scholarly debate revolves around the methodological ability to study and practice a social phenomenon such as sustainability efficiently and recommend using systems dynamics (Marshall and Brown, 2003). While Milne *et al.* (2006) take the view that sustainability should not be framed as a long-term journey, but rather requires radical change to current business practice, Fineman (2001) warns of the complexity and confusion for managers that surround the concept in general.

Nevertheless, in several cases there exists a certain degree of overlap between both eco-centric and econo-centric focus; this is particularly evident when authors are trying to bridge the gap between the two perspectives (e.g., Fineman, 2001; Gladwin and Kennelly, 1995; Shrivastava, 1994; Marshall and Brown, 2003; Reilly, 1999). Frequently, they also attempt to avoid the predominantly partial character within the theoretical literature and extend their thinking to more systemic perspectives of environmental and sustainable issues (Gladwin and Kennelly, 1995; Hart, 1997; Jennings and Zandbergen, 1995; King, 1995; Marshall and Brown, 2003; Prasad and Elmes, 2005a, 2005b; Shrivastava, 1994; Starik and Rands, 1995; Starkey and Crane, 2003).

In these contributions of systemic thinking scholars debate the place of the corporation within the wider society. Many of these contributions attempt to develop theories for radically new approaches to environmental management that involve a shift from the present paradigm's focus on internal, operational strategies to a more far-reaching concept of holistically integrating (ecological) sustainability into future organisational visions and decision-making. In this sense, it endeavours to broaden the traditional view from pure environmental protection towards making companies responsible for wide-ranging, external issues such as 'over-consumption' and 'over-population' (Hart, 1997; Starik and Rands, 1995).

A second significant stream of the theoretical literature explores the issues concerned with the payoffs possibly attributable to firms being environmentally responsible. This literature has a highly anecdotal and issue-selling character and is thus often written having management practitioners in mind as the targeted readership. While setting-up costs can certainly occur, the list of alleged benefits truly appears to outweigh these drawbacks; examples cited are: reduced costs through ecological efficiencies; capturing emerging 'green' markets by establishing social presence in markets and gaining social legitimacy; gaining first-mover advantage and becoming environmental leaders in their industries; ensuring long-term profitability; establishing better public and community relations; improving firm image; and reducing long-term risks (stemming from resource depletion, fluctuation in energy costs, product liabilities, pollution and waste management) (Shrivastava, 1995a: 937 and 955). Additionally, 'by re-orientating advertising to its educational mission and by promoting responsible consumption, corporations can play a constructive role in reducing excessive consumption and minimising waste' (Shrivastava, 1995a: 954). Some research, for example by Schoemaker and Schoemaker (1995), Levy (1997), Porter and van der Linde (1995), and Nehrt (1998) suggests that environmental regulations can be used to improve operational efficiency and reduce financial burdens through the elimination of waste and legal penalties for non-compliance. Additionally, they claim that firms can draw upon environmental regulation in order to become more innovative and even gain first-mover advantages. The emphasis in terms of environmental challenges in the theoretical literature is thus often placed on the effects of environmental legislation and regulation rather than specific environmental issues.

Beyond these major bodies of research, the literature is very diverse with foci around a variety of strategic and operational issues. On the implementation level, theoretical articles are trying to explain, advocate and develop particular environmental ideas such as sustainable product design (Chen, 2001; Fuller and Ottman, 2004), voluntary green initiatives (Cortazar and Schwartz, 1998; Delmas and Terlaak, 2001; Levi and Nault, 2004), environmental management system adoption (Rondinelli and Vastag, 1996), green supply chain management (Champion, 1998; Corbett and DeCroix, 2001), environmental input/output analysis (Landry, 1997), environmental reporting (Kolk, 2000), recycling (Biddle, 1993), and environmental product differentiation (Rheinhardt, 1998). With respect to climate change Hoffman (2005) discusses general strategies to

prepare for the surrounding uncertainties and complexities, Schendler (2007) focuses on renewable energy certificates and White (2006) on carbon emission trading.

Overall, the theoretical mainstream literature is characterised by an apparent dichotomy of paradigms. The distinctions between the two world-views can be summarised as follows: On the one hand there is the orthodox, static, and partial view, which is heavily economics-oriented and which perceives of environmental issues predominantly as business problems that can or should be addressed as opportunities for corporate growth and profitability. This paradigm often operates in isolation from wider antecedents and consequences and only relatively direct linear relationships of cause and effect are analysed. In contrast to this econo-centric perspective stands the eco-centric view, which is comparatively more dynamic and systemic. Core to its message is that economic aspects form only part of the global system, and hence that environmental issues must be managed within a much wider context.

2.4.3 RESEARCH FINDINGS OF ENVIRONMENTAL MANAGEMENT STUDIES

This section explores the findings of empirical mainstream research. Given the need for firms to consider environmental issues more proactively, this review has been approached with a greater emphasis on generally strategic aspects and perspectives. In particular, this section examines to what extent context, contents, processes and outcomes of environmental management have been studied in the management mainstream literature.

Context. The organisational context has been highlighted as one of the key explanatory variables shaping firm strategy, and in this case, why some firms are more inclined to respond to environmental issues than others. A variety of (firm) factors have been examined within the literature, among them the pressure exerted by stakeholders (Buysse and Verbeke, 2003; Christmann, 2004; Fineman, 1996; Henriques and Sadorsky, 1999; Kassini and Vafeas, 2006), legislation and regulations (Fineman, 1996; McKay, 2001; Rothenberg, 2007), issues (Hoffman, 1999, 2005), economic deregulation (Delmas *et al.*, 2007), resources (Judge and Douglas, 1998; McKay, 2001), the media (Bansal, 2005; Klassen and McLaughlin, 1996), individual concerns and organizational values (Bansal, 2003), managerial interpretations (Sharma, 2000), capabilities (Sharma and Vredenburg, 1998), managerial discretion and responsibility (Aragón-Correa *et al.*, 2004), organizational and supervisory encouragement (Ramus

and Steger, 2000), competitiveness, legitimation, and ecological responsibility (Bansal and Roth, 2000; González-Benito and González-Benito, 2005), perceived environmental uncertainty (Lewis and Harvey, 2001), executives (Aragón-Correa *et al.*, 2004), board size, constitution and ownership (Kassini and Vafeas, 2002), an organization's capacity for change (Judge and Elenkov, 2005), organizational technical and institutional responses (Rothenberg, 2007), multinational customers and exports (Christmann and Taylor, 2001), the possibility of investments becoming industry standard (Thornton *et al.*, 2003), and a firm's policy commitment and approach to implementation (Winn and Angell, 2000). On the other hand both the lack of good environmental information (Ramus, 2001) and firms operating in unfamiliar business conditions (King and Shaver, 2001) have been argued to negatively affect their ability to respond to environmental demands.

Contents. Given the variety of contextual factors influencing a firm's response to environmental issues and hence shaping its environmental strategy empirical research aims to classify these corporate environmental strategies. Furthermore, studies attempt to determine to what extent different firms are heeding these calls to improve their environmental responsiveness by examining the contents of their respective environmental strategies. Broadly, most taxonomies are arranged along a spectrum of varying degrees of legislative compliance and beyond. Examples include Aragón-Correa (1998) who differentiated between non-compliance, compliance, compliance plus, leading edge, and environmental excellence; Henriques and Sadorsky (1999) who grouped firms as being reactive, defensive, accommodative, and proactive; Sharma (2000) who created a continuum of conformance to voluntary; Sharma and Vredenburg (1998) who classified firms as being reactive and proactive; and Winn and Angell (2000) who distinguished between deliberate reactive, unrealized, emergent active, and deliberate proactive greening policies and approaches. McKay (2001) categorised four strategies in response to the introduction of new environmental legislation (in her case the Environmental Bill of Rights in Canada). The four strategies are re-shaping, pre-empting, time-shifting, and safeguarding. These observations thus lead to the conclusion that firms vary greatly in the extent to which they respond to environmental pressures.

Process. Of great significance for scholars and practitioners is the understanding of how firms are effectively responding to environmental issues. Researchers do so by taking a closer look at existing strategies, policies, practices and actions currently employed by

firms that are exposed to environmental issues. This literature is automatically more directed towards the operations functions, but does also include aspects of human resource management, finance, marketing and strategy. Such thinking reflects the growing recognition for seeing environmental management in a more holistic way with both strategic and operational dimensions, which ideally should be integrated and balanced. In particular, studies examine firms' general environmental management (Halme, 2002; Klassen and McLaughlin, 1996; Lamming and Hampson, 1996; Lewis and Harvey, 2001), their environmental policies (Christmann and Taylor, 2001; Florida, 1996; Ramus and Steger, 2000; Winn and Angell, 2000), standards (Dowell *et al.*, 2000; Tenbrunsel *et al.*, 2000), environmental leadership (Egri and Herman, 2000) and strategic planning (Judge and Douglas, 1998). More specifically, some scholars investigate the use and benefits of voluntary environmental codes and industry self-regulation (Howard *et al.*, 2000; King and Lennox, 2000) such as the Chemical industry's 'Responsible Care' or other voluntary green initiatives (Clemens and Douglas, 2006).

On the operations side numerous empirical contributions study why companies are adopting environmental management systems (EMS) (Boiral, 2007; Christmann and Taylor, 2001; Darnall and Edwards, 2006; Florida and Davison, 2001; González-Benito and González-Benito, 2005; King *et al.*, 2005; Schaefer, 2007). Additionally, further process research focuses on a firm's environmental technology portfolio (Klassen and Whybark, 1999), environmental innovation (Rothenberg, 2007) and best practice (Christmann, 2000), reuse and recycling (Geyer and Jackson, 2004), the development of environmentally-friendly new products (Pujari *et al.*, 2003), investment in pollution-reducing processing equipment (Nehrt, 1996), and environmental supply chain management (Lamming and Hampson, 1996). More centred on human resources are themes, such as the environmental attitudes of managers and employees (Branzei *et al.*, 2004; Kilbourne *et al.*, 2002; Minton and Rose, 1997), and specifically issues, such as employee eco-initiatives (Andersson and Bateman, 2000; Cordano and Frieze, 2000; Gilley *et al.*, 2000; Ramus, 2001; Ramus and Steger, 2000; Rothenberg, 2003). Marketing oriented research entails studies of environmental labelling (Bostroem, 2006), green advertising (Carlson *et al.*, 1996), green marketing (Mathur and Mathur, 2000), and the profiling of green customers (Diamontopoulos *et al.*, 2003; Kilbourne *et al.*, 2002; Minton and Rose, 2002; Roberts, 1996; Roberts *et al.*, 1997).

Outcomes. Finally, studies have been designed to measure (if at all possible) the effects and other outcomes of improved environmental responsiveness and strategic actions. This takes the form of measuring and correlating strategies with general economic performance (Clemens, 2006; Darnall and Edwards, 2006; Dowell *et al.*, 2000; Judge and Douglas, 1998; Nehrt, 1996; Russo and Fouts, 1997; Scharfman and Fernando, 2008), share price trends in particular (Bansal and Clelland, 2004; Klassen and McLaughlin, 1996; Mathur and Mathur, 2000), and environmental performance (Aragón-Correa *et al.*, 2004; Christmann, 2000; Clemens, 2006; Clemens and Douglas, 2006; Florida, 1996; Judge and Douglas, 1998; Judge and Elenkov, 2005; Kassinis and Vafeas, 2006; King and Shaver, 2001; Pujari *et al.*, 2003; Ramus, 2001; Russo and Harrison, 2005). Of great significance in this respect are studies focussing on the links between environmental and economic performance. Within this literature survey four articles exist which have examined these direct links; findings indicate that 'it pays to be green and that this relationship strengthens with industry growth' (Russo and Fouts, 1997: 534). Clemens found a positive link and claimed that 'those small firms that perform better environmentally are also the most successful financially' (2006: 492). Similarly, while Klassen and McLaughlin (1996) measured significant positive returns for strong environmental management as indicated by environmental performance awards, and significant negative returns for weak environmental management as indicated by environmental crises, using financial theory, Scharfman and Fernando (2008) also recently established that firms with improved environmental risk management have a lower cost of capital. With regard to more specific environmental issues, Darnall and Edwards (2006) asserted that privately and government owned firms accrued higher EMS adoption costs in comparison to publicly owned companies, Judge and Douglas stated that 'the level of integration of environmental management concerns in the strategic planning process was positively related to financial and environmental performance' (1998: 241), and Nehrt's (1996) study finds that earlier investors in pollution-reducing processing equipment have higher profit growth than later investors. With respect to market-based assessments of economic performance results suggested that 'legitimate firms [in terms of conforming to stakeholders' expectations] incur less unsystematic stock market risk than illegitimate firms' (Bansal and Clelland, 2004: 93) however, Mathur and Mathur concluded that 'investors consider green promotional strategies to be value-destroying in nature' (2000: 198). Nonetheless, all in all these studies seem to paint a slightly more positive picture of the environmental versus economic performance link. A general problem with this sort of studies is the

determination of cause and effect, and especially the relevance of contextual and other unobserved, but potentially highly influential factors such as, for example, firm size, industry sector, time lags, and location.

2.4.4 THE ENVIRONMENT AS DEPENDENT AND INDEPENDENT VARIABLE

Finally, I will investigate to what extent the 'natural environment' has played a role both as a dependent and independent variable in existing empirical studies. Figures 8 and 9 give an overview of two thematically different approaches to employing the 'natural environment' in empirical research. Figure 8 lists in what form the environment has been used as either a direct and/or indirect cause for testing a particular relationship. In many cases the companies studied appear to be capitalising on such relationships. In other words, the relationships under investigation apply the environment as an antecedent or explanatory variable for a range of (mostly positive) individual and organisational behaviours, outcomes, or attributes.

Figure 9 on the other hand is more concerned with specifically beneficial outcomes for the environment itself, that is to say, in how far the natural environment may become beneficiary of firms' and individuals' behaviour, actions, and processes. In many instances this does not have to be a direct relationship; frequently corporate and individual antecedents result in behaviour (e.g., EMS adoption, environmental investments) that may indirectly lead to better outcomes for the environment.

Figure 8: Relationship studied in the empirical literature: Environment as direct and/or indirect cause (firm as potential beneficiary)

Fineman & Clarke (1996)	Stakeholder influence and managers' ability to identify, define and construct stakeholders > industry's subsequent response
Carlson *et al.* (1996)	Green advertisements > IMC
Nehrt (1996)	Timing and intensity of investments > first-mover advantage
Sharma & Vredenburg (1998)	Strategies of proactive responsiveness > emergence of unique organisational capabilities; firm competitiveness.
Aragón-Correa (1998)	Environmental strategy proactivity > approaches to environmental management
Andersson & Bateman (2000)	Identifying, packaging, selling > successful environmental championing
Ramus & Steger (2000)	Environmental policy, supervisory support behaviours > employee environmental initiatives
Howard *et al.* (2000)	Institutional pressures > voluntary environmental codes
Sharma (2000)	Managerial interpretations of environmental issues > corporate choice of environmental strategy
Flannery & May (2000)	Individual & contextual influences > managers' environmental decision intentions
McKay (2001)	External pressures > organisational responses
Lewis & Harvey (2001)	Perceived uncertainty in the business environment > strategic decision making
Halme (2002)	Environmental learning > corporate environmental management
Christmann (2004)	Stakeholder demands > firms' responses to stakeholder pressures
Lenox & King (2004)	Internal information provision > organisational absorptive capacity
Roome & Wijen (2006)	Stakeholder power > organizational learning
Rothenberg (2007)	Influence of institutional, technical pressures > managerial action
Klassen & McLaughlin (1996)	Environmental management > improved perceived future financial performance
Russo & Fouts (1997)	Environmental initiatives > economic performance
Judge & Douglas (1998)	Integration of environmental concerns in the strategic planning process > financial & environmental performance.
Christmann (2000)	Complementary assets, implementing best practices > cost advantage
Gilley *et al.* (2000)	Announced environmental initiatives > stock returns
Dowell *et al.* (2000)	Stringent global corporate environmental standards > stock market performance
Mathur & Mathur (2000)	Corporate announcements of green marketing activities > wealth effects, or stock price reactions
Bansal & Clelland (2004)	Environmental performance conforms to stakeholders' expectations > stock price volatility
Geyer & Jackson (2004)	Supply loops > economic and environmental performance
Clemens (2006)	Green performance, green economic incentives > financial performance
Scharfman & Fernando (2008)	Environmental risk management > WACC

Figure 9: Relationship studied in the empirical literature: Environment as direct and/or indirect beneficiary

Florida (1996)	Advanced production practices, innovative approaches > environmentally conscious manufacturing.
Lamming & Hampson (1996)	Environmental supply chain management
Fineman (1996)	Emotional meanings managers attribute to greening > pro-environmental organizational changes
Minton & Rose (1997)	Attitude, the injunctive norm, or the personal norm > environmentally concerned behaviours, behavioural intentions
Fineman (1997)	Social/political contexts of managers' organisational lives > the green corporate agenda
Henriques & Sadorsky (1999)	Perceptions of the relative importance of different stakeholders > environmental strategy proactivity
Klassen & Whybark (1999)	Investment in environmental technologies > environmental performance
King & Lenox (2000)	Drivers & barriers > voluntary industry self-regulation
Cordano & Frieze (2000)	Environmental managers' pollution prevention attitudes, perceptions of norms for environmental regulation, perceived behavioural control, past source reduction activity of their facilities > source reduction preferences
Tenbrunsel *et al.* (2000)	Standards > decision processes and subsequent environmental outcomes
Winn & Angell (2000)	Policy commitment, approach to implementation > corporate greening
Whiteman & Cooper (2000)	Ecological embeddedness > sustainability
Bansal & Roth (2000)	Competitiveness, legitimation, ecological responsibility > corporate ecological responsiveness
Ramus (2001)	Innovation > environmental innovation
Christmann & Taylor (2001)	International ownership, customer linkages > environmental self-regulation
King & Shaver (2001)	Foreign and domestic owned capabilities > environmental performance
Bowen (2002)	Organizational slack > corporate greening
Orsato *et al.* (2002)	Power relations in business-environment relationships > industry greening
Kilbourne *et al.* (2002)	Dominant social paradigm (DSP) > environmental attitudes
Kassinis & Vafeas (2002)	Governance structure, stakeholder pressures > adherence to provision of environmental laws and regulations
Pujari *et al.* (2003)	ENPD activities > market and eco-performance
Thornton *et al.* (2003)	Regulatory, social, and economic licenses to operate, enforced by external stakeholders > environmental performance
Rothenberg (2003)	Dynamics of worker participation > environmental improvements
Buysse & Verbeke (2003)	Importance attached to stakeholders > level of proactiveness of environmental strategies
Bansal (2003)	Individual concerns & organizational values > longitudinal corporate environmental responses
Russo (2003)	Natural capital, site specificity, institutional environments > emergence and growth of sustainable industries
Aragón-Correa *et al.* (2004)	Specific individuals responsible for environmental matters > environmental commitment
Branzei (2004)	Leaders' cognitions > formation of novel responses to the value-laden issue of corporate greening.
Sharma & Henriques (2005)	Managers' perceptions of different types of stakeholder influences > types of sustainability practices
Judge & Elenkov (2005)	Organization's capacity for change > environmental performance
Bansal (2005)	Resource-based and institutional factors, media > longitudinal corporate sustainable development
Russo & Harrison (2005)	Internal processes (reporting relationships, monetary incentives, coordination) > environmental performance
Boström (2006)	Individual power resources > action capacity, symbolic resources, environmental labelling
Clemens & Douglas (2006)	External coercion, internal resources > voluntary green initiatives (VGIs)
Kassinis & Vafeas (2006)	Relationship between stakeholder pressures > firm environmental performance

Boiral (2007)	External pressures > EMS adoption, organizational implications
Delmas *et al.* (2007)	Economic deregulation > firm strategies, environmental quality
King *et al.* (2005)	Strategic action, information asymmetry > EMS certification
González-Benito & González-Benito (2005)	Ethical, competitive, relational motivations > ISO14001 certification
Darnall & Edwards (2006)	Complementary capabilities, access to resources, ownership structure > EMS adoption costs
Schaefer (2007)	External & internal institutional forces, environmental performance issues, economic performance issues > EMS adoption

2.5 DEVELOPMENT OF A RESEARCH AGENDA

So far, I have conducted a review of the mainstream environmental management literature with the aim of characterising the nature and significance of research concerned with environmental issues. As a result of these findings, several conclusions can be drawn, which reveal promising opportunities for high-quality future research. First, environmental management has been studied in equal measures by using both empirical and theoretical approaches to knowledge building, therefore implying no existing bias towards either of the two. Second, environmental management in the mainstream literature is a relatively diverse and fragmented subject area. By developing and applying a great variety of theories, themes and concepts, scholars have highlighted and described salient conditions and facts surrounding environmental management, while other studies have analysed and tried to explain causes and effects by testing a multitude of relationships. Having set the focus of this review on strategic perspectives of environmental management within the general management mainstream it is notable that a major recurring theme is the study on the relationship between a firm's environmental and economic performance. In addition, research on environmental strategies contains interrelating aspects of environmental policies and processes that reach out into operations and other functionally oriented domains of environmental management. Lastly, within the domain of empirical research, the methodological approaches entail predominantly quantitative, cross-sectional studies of mostly large North American firms. It could thus be argued that there are gaps in the literature with respect to using different research methods. This presents opportunities for other, complementary research studies, which would aim to fill this gap.

In developing an agenda for future research in environmental management, I will draw on three bodies of research. First, I draw on the critical review of earlier research developed above. Second, I refer to emerging themes within the strategy literature. Third, I draw upon critiques of research methods applied in related research. This allows the articulation of a number of issues that could stimulate research in a variety of ways. Specifically, I discuss four issues, which, tackled together or separately, have the capacity to produce innovative and informative research.

Conceptualisation/theory. As was described earlier the theoretical literature usually revolves around the dichotomy between 'eco-centric' and 'econo-centric' perspectives of what place companies are and should be taking within society. While this disparity of views is partly reflected in the orientation and ethos of different academic journals, several

contributions have sought to unite these opposing paradigms by expanding the arguments using systemic conceptualisations. Important in this context are firstly, a broadened understanding of the significance of sustainable development (Gladwin and Kennelly, 1995), and secondly, the need for more multi-level and multi-systemic research (Starik and Rands, 1995). Yet, in spite of these rallying calls, the empirical reality thus far appears to be rather different. Most studies in the mainstream continue to be of partial character where linear cause and effect relationships dominate the modelling approaches. Given the finding that theoretical debates of environmental management have preceded empirical studies by some time, it remains to be seen in how far academic discourses from the 'eco-centric' and 'sustain-centric' perspectives will eventually find their way into the management mainstream and lay the foundations for empirical research. This could particularly be very useful in the development of more dynamic and systemic models – an aspect I will return to later when discussing the importance of longitudinal studies.

Strategy. In terms of strategic perspectives of environmental management, the existing literature and empirical research in particular, has analysed companies' behaviour using, among many others, a combination of institutional, stakeholder, and resource-based views. What is missing, however, in this literature is a framework that would combine these views into a more comprehensive conceptualisation, which would take into account the different circumstances and conditions faced by companies. Context-wise, there have only been three contributions directly addressing the issue of climate change (Hoffman, 2005; Levy, 1997; White, 2006). Given the rising prominence of debates surrounding this phenomenon, this is puzzling since regardless of one's personal stance, the commercial ramifications appear to becoming more and more significant for business strategy and competitive advantage. On the other hand, the lack of reflection on this issue in the mainstream journals may indicate the uncertainties and complexities involved at scientific and political levels and hence the reluctance to contribute to these ongoing and heated discussions. I would, nonetheless, expect some form of analysis into firms' engagement with the subject and their approaches to dealing with continuing ambiguity.

With reference to the content and process aspects of environmental management strategies, I have reviewed the numerous contributions classifying firms' environmental responses. By far less is know about the transitions between different classes of environmental strategies (Winn and Angell, 2000). This does again resonate with the ensuing argument about the need for more longitudinal research. Particularly interesting are questions such as what is the general trend within the evolution of environmental strategies? Do firms

change over time? How does that affect the general population of firms in the sense that, for instance, do old 'compliant-only' firms get replaced by new leading edge firms? Additionally, to what extent have environmental strategies become integrated with general business strategy, and in how far is this having an effect on the competitive landscape?

Environment. The analysis of the 'natural environment' as both dependent and independent variables in empirical research has indicated that both fields are very well covered in the management mainstream. At the same time one might wonder, which are those firms that (successfully) manage to avoid any form of environmental management? How do they cope, and what does that generally suggest about coercive institutional forces and voluntary environmental management behaviour? In how far do marketing ploys such as 'greenwashing' achieve the desired effects? Again, this sort of analysis might shed light on firms that quite obviously manage to differentiate themselves without potentially having to endure negative consequences.

Methodology. The first issue concerns the balance between quantitative and qualitative methods in existing empirical work. I observed above that the existing empirical literature is characterised by the dominance of quantitative methods, primarily implemented through surveys or secondary data. Although quantitative methods have always formed part of a largely positivistic arguing epistemology similar to creating knowledge in the natural sciences, over the years these approaches have also often proved to be insufficient and unsatisfactory for describing and explaining reality. Common critiques are based around the research methods applied as part of a purely quantitative research strategy. Examples include a general lack of appreciation of the differences between the natural and social world (Bryman and Bell, 2003), common methods bias (Christmann and Taylor, 2001), social desirability bias and affirmation bias (Crane, 1999), uncertainty as to who is actually filling in the surveys, the respondents' assumed relevance and knowledge for the survey (Crane, 1999), 'all data are subjective' (Carlile and Christensen, 2004: 18), questionnaire fatigue, misunderstanding and inappropriateness of questions and respondents, no possibility for probing answers, missing data, and potentially low response rates (Bryman and Bell, 2003).

Quantitative methods are also criticised with respect to the lack of clarity and definition of concepts employed by researchers. Especially with an immensely value-laden and in some sense ethical topic such as environmental management, using solely quantitative methods may exclude a much richer picture of understanding reality and hence neglect important

contextual factors that are more likely to be detected with the help of qualitative methods (Crane, 1999). For as long as concepts still entail a high degree of subjectivity and personal interpretation (e.g., green, environmental, sustainable, etc.), verifying theories and revealing truth through the use of empirical quantitative surveys will remain inappropriate and misleading (Crane, 1999). Instead, Crane proposes that 'understanding meaning must precede measurement' (1999: 245). This apparent dichotomy between quantitative and qualitative research strategies bears its origin on a much higher level of research philosophies: epistemological and ontological considerations. However, because an in-depth exploration of these influences on the creation of knowledge in the social sciences would exceed the scope of this chapter, for now it suffices to explain that the underlying question to the problem of methodological choices revolves around 'how should the management researcher describe reality, reveal truth, and contribute to knowledge in the field of business ethics?' (Crane, 1999: 238). This assumes that environmental management can indeed be framed as an exclusively ethical problem when, in fact, it can be also be argued to be more than just that. Notwithstanding that, the argument put forward here is that a more diverse approach towards the use of research strategies would mitigate some of the critiques mentioned above of applying quantitative methods only. Including qualitative strategies into the analysis of environmental management could help in the formation and definition of more precise concepts and theories, in the unearthing of subjective interpretations, and in the deeper understanding of contextual influences and outcomes.

A second major weakness of existing research in the mainstream lies in the cross-sectional nature of almost all of its empirical work. Because of this, environmental strategy research has so far avoided taking into account the temporal dimensions of firms' environmental strategies. On the basic firm strategic level and as mentioned earlier, little is known about the developments of firm environmental management behaviour over time. With a small number of exceptions, there appears to be a considerable gap in the literature in terms of temporal research design. The aim of a longitudinal study on corporate environmental strategy could therefore be to effectively analyse the drivers and outcomes of, as well as the enabling and constraining influences on, environmental management behaviour as a result of the changes in time. This would allow the charting of general trends and a better analysis of causal influences. With particular respect to the definition of corporate environmental strategy mentioned before, several significant insights are conceivable: Firstly, the observation of changes in regulations and hence their direct effects on regulatory compliance as part of corporate environmental strategy. Secondly, the

observation of changes in other contextual factors, that is, stakeholder attitudes, technological innovations and developments, introduction and development of political and economic measures (for instance, Kyoto protocol, carbon emissions trading) and hence their impacts upon voluntary actions and other opportunistic behaviour as enacted by corporate environmental strategy (Bartlett and Ghoshal, 1991). At the same time, repeated observation of the same firms may uncover the existence of time lags, and questions would arise about how they are explainable, and what do they suggest about firms' levels of preparedness and responsiveness? In a similar vein, to what extent are there any transitions between the different strategy classifications?

Given the varying nature of societal trends and concerns with respect to environmental issues, the salience of environmental management ought to fluctuate over time just as much, and firms' environmental responses would therefore possibly undergo similar trends. Studying temporal developments may prove to be a useful exercise and hence lead to the observation of firm strategic decision-making and change implementation processes (Pettigrew, 1992) over a longer period of time as opposed to accepting cross-sectional snapshots as an accurate and comprehensive depiction of reality (Jarzabkowski, 2004; Pettigrew, 1990, 1992; Porter, 1991). The point made here is that many issues only become visible after studying them over a longer period of time. For instance, a firm making irreversible commitments under uncertainty such as investing in new, more environmentally friendly plants and technologies will define its firm specific resources for the years to come and thereby creates a path dependency which restricts its immediate adaptability as part of any other strategies (Porter, 1991). As Pettigrew commented, 'History is crucial; antecedent conditions shape the present and the emerging future' (1992: 10). These patterns of choices are of valuable interest to the field of environmental management research. This idea resonates with Jarzabkowski (2004) in that it appreciates the tendency of strategic practices to become either recursive or adaptive. 'The overall research challenge is to link the content, contexts, and processes of change over time to explain the differential achievement of change objectives' (Pettigrew 1990: 268).

Another important aspect of the influences of time on environmental strategy is the impact on theories such as the Porter's positioning model, the resource-based view of the firm and institutional theory. One of Sztompka's ontological assumptions highlights the complexities involved: 'Social reality is not steady state, but, rather, a dynamic process' (Pettigrew, 1992: 9). With changes in the competitive environment as well as investments, divestments, and other developments in firm-based resources over time (Jarzabkowski,

2004), there is a real need 'to explore holistic explanations, scope to examine causal processes directly, and to look at them in context' (Pettigrew, 1992: 10). In short, a range of causes (for example, fines, penalties, media attention, mimicry, resource-based variables) could explain the reasons why firms commit to sustainable development, and their respective importance will not be equal at all times (Bansal, 2005). Again, this would direct the attention of empirical research to more systemic models and may present fruitful opportunities for changing the research focus and hence the chosen point-of-view from which environmental strategies are studied.

2.6 CHAPTER SUMMARY

There is a pressing need for companies to embed a concern for environmental issues within their mainstream business activities and processes. With this in mind, I have explored the character of environmental management research within mainstream management journals in order to cast light on its focus, evolving salience, concepts and methods. Chapter 2 has presented an analysis of environmental management research published in leading mainstream management journals between 1990 and 2008 and highlighted a number of concerns with the current conceptual and empirical research. In particular, I note the primarily quantitative, cross-sectional character of most empirical research, and its relatively narrow focus on particular countries and industries. At the same time, theoretical contributions are marked by disagreements between orthodox, static and partial conceptualisations on the one hand and more systemic and dynamic approaches on the other. It is undoubtedly an encouraging sign to witness the impact of environmental issues on the management mainstream literature, as is the on-going dialogue between the different paradigms, which is likely to shape the future of research in this field. Building upon this critical review of extant research, I have then constructed a research agenda for future environmental management research that draws upon strands of thinking within the strategy literatures and, I argued, offers a number of constructive paths to high-impact environmental management research. More to the point, in drawing on this research agenda, the following Chapter 3 will review and discuss the existing state of the literature on the evolution of corporate environmental strategy in more detail and thus reinforce the foundations for this thesis.

CHAPTER 3: CONCEPTUAL DEVELOPMENT

3.1 INTRODUCTION

Consistent with the research agenda developed in the previous literature review Chapter 2, Chapter 3 develops an organising framework which views strategy as self-organising behaviour that emerges as the result of agents interacting with each other and their organisational environment by drawing on complexity theory and the extant management literature. The second part of this chapter explores the possible contributions of one of complexity theory's key concepts, the rugged fitness landscape, which aims to explain the universal phenomenon of evolutionary processes. In particular, I outline a conceptualisation of how organisations change their environmental strategy as a result of adaptive walks across a changing fitness landscape. Chapter 3 has the following aims:

- To develop an organising framework of corporate strategy based on complexity theory;
- To outline a conceptual development of the evolution of corporate environmental strategy consistent with this organising framework;
- To formulate research implications and several propositions designed to address and test the validity of the organising framework and the conceptual development.

The remainder of this chapter is structured as follows. First, I review contemporary environmental strategy research before developing an organising framework by applying complexity theory to the field of corporate strategy. Following that, I will then describe a conceptualisation of changes in corporate environmental strategy based on this organising framework. A final section concludes by theorising the implications of the framework and conceptualisation for future research and this thesis in particular.

3.2 CRITIQUES TO CONTEMPORARY ENVIRONMENTAL STRATEGY RESEARCH

A growing recognition of the degradation of the natural environment, increasing resource scarcity, globalisation, and the converging scientific, social and institutional opinions concerning climate change have all contributed to increased pressure on corporations to address their environmental impacts. These pressures have stimulated increasing numbers of companies to develop environmental strategies, defined as 'pattern[s] in action over time intended to manage the interface between business and the natural environment. […] Environmental strategy refers to outcomes in the form of actions firms take for regulatory compliance and to those they take voluntarily to further reduce the environmental impacts of operations' (Sharma, 2000: 682). Reflecting the increased salience of environmental

issues within business practice, a vast and highly varied academic and practitioner literature has emerged that offers a diverse range of conceptualisations of corporate environmental strategy, numerous prescriptive and normative arguments concerning the need for improvements in business environmental practices, and a large body of empirical research that examines how, if at all, firms are managing environmental impacts and what the impacts of these strategies are (e.g., Hart, 1995; Bansal and Roth, 2000; Berry and Rondinelli, 1998; Clemens and Douglas, 2006; Porter and van der Linde, 1995; Bansal and Clelland, 2004; Buysse and Verbeke, 2003; Clemens and Douglas, 2006).

However, in spite of this proliferation in interest in strategic management of corporate environmental impacts, extant research embodies a number of limitations. First, existing theoretical work is dominated by largely static conceptions of the nature of corporate environmental strategy (Kolk and Mauser, 2002). This appears to contradict critiques within general strategy research that have tried to argue for conceiving of corporate strategies as dynamic processes, which continuously shape the organisation and which are affected by a multitude of factors and actors (Bartlett and Ghoshal, 1991; Pettigrew, 1992; Porter, 1991; Stacey, 1995). By contrast, most extant models of environmental strategy specify mostly direct causal relationships and ignore aspects of time and evolution (Bansal and Roth, 2000; Berry and Rondinelli, 1998; Clemens and Douglas, 2006). More importantly, existing classifications of environmental strategy (Orsato, 2006; Roome, 1992; Sharma, 2000; Sharma and Vredenburg, 1998) also do not include details of the possible transition paths from one class of strategy to another. The only exception being Winn and Angell (2000) who outline several possible scenarios of dynamic greening processes that are developed on the back of their framework which describes a firm's configuration with respect to both its environmental policy commitment and its approach to implementation.

Second, conceptual development concerning corporate environmental strategy typically adopts a partial, rather than a systemic, approach at the organisational level (Bansal and Roth, 2000; Berry and Rondinelli, 1998; Clemens and Douglas, 2006; Orsato, 2006) in the sense that 'at a theoretical level, writers on environmental strategy tend to simply rewrite the corporate strategy literature in environmental terms' (Newton and Harte, 1997: 87). There is thus a tendency to equate the purpose and process of environmental strategy with that of general strategy, but then to study it in isolation from corporate and other functional strategies. Essentially, existing research appears to exclude the relationship between broader corporate strategy and environmental strategy in its conceptualisation. Following

the traditional 'reductionist approach', scholars generally tend to consider parts independently rather than to acknowledge the growing recognition that insight into the emergence of certain phenomena at higher levels cannot be simply deduced from the study of parts at the lower levels within a system; or to quote Aristotle's widely used dictum 'emergent properties in a system are something other (not merely greater) than the sum of its parts'. At the same time, despite several normative calls by scholars (Baron, 1995; Hart and Milstein, 2003; Orsato, 2006) and by political institutions (European Commission, 2001) to incorporate, or to 'mainstream', environmental strategy into general business strategy, environmental strategy is usually construed as a special case of general firm strategy, and there is very little theory concerning how environmental strategy forms part of the wider corporate strategy and how this interrelationship works and affects organisational behaviour (King, 2000). In a similar vein, the prevailing view is that to a great extent organizational change with respect to environmental strategy originates from (mostly senior) managerial choice and decision-making (Baron, 1995; Orsato, 2006; Rheinhardt, 1998; Rosen, 2001; Sharma, 2000). Although research exists that investigates the influence and effects of individuals and environmental champions on firms' specific environmental issues and (mostly operational) responses (Cordano and Frieze, 2000; Crane, 2000b; Ramus, 2001; Ramus and Steger, 2000; Rothenberg, 2003), few studies integrate the outcomes of such intra-organisational interaction between agents into models of wholesale changes in corporate environmental strategy (Andersson and Bateman, 2000; King, 2000). In essence, there appears to be a lack of taking account of the emerging nature of strategy as originally conceptualised by Mintzberg (1978).

Finally, the last concern revolves around the general lack of understanding of the nature and evolution of environmental strategy, which ties in with the previous two concerns. A tacit assumption appears to exist (combined with normative calls) that in general firms (should) only proceed in a linear and consistently positive manner from the non-compliant types of environmental strategy towards more environmentally proactive strategies over time (Berry and Rondinelli, 1998; King, 2000). Recently, however, doubts have emerged as to whether 'proactive environmental management' is or can be economically beneficial at all for all companies in all circumstances (Aragón-Correa and Rubio-López, 2007; Christmann, 2000; Orsato, 2006; Shelton, 1994; Shelton and Shopley, 1996) and they therefore question this taken-for-granted belief.

In recognition of these limitations, this chapter begins by developing an organising framework of corporate strategy within a complex adaptive systems perspective. As

Coleman argues, 'complexity theory views organisations as 'complex adaptive systems' which evolve with the environment through the self-organising behaviour of agents navigating 'fitness landscapes' (Kauffman, 1995a) of market opportunities and competitive dynamics. Changing external and internal 'attractors' influence the process of adaptation by agents (Kauffman, 1995a; Morgan, 1996; Stacey, 1996)' (Coleman, 1999: 33). Complex adaptive systems (CAS) are special cases within the domain of complex systems theory that study how relationships between parts give rise to the collective behaviour of a system and how a system interacts, forms relationships with, and adapts to its environment. A complex adaptive system is *complex* in that it is diverse and made up of multiple interconnected elements, and *adaptive* in that it has the capacity to change and learn from experience (Dooley, 1996, 2002; Gell-Mann, 1995; Holland, 1995).

Given the inherently dynamic and multifaceted topic of the thesis, complex systems theory has been chosen mainly to respond to the growing number of calls from different backgrounds within the management literature to consider and integrate the notions of evolution, complexity and systemic thinking in conceptualisations of strategy (Anderson, 1999; Barnett and Burgelman, 1996; Beinhocker, 1999; Caldart and Ricart, 2004; e Cunha and da Cunha, 2006; Hamel, 1998; Mason, 2007, 2008; Pascale, 1999; Rivkin, 2000; Stacey, 1995, 1996), organisational change (Anderson *et al.*, 1999; Beeson and Davis, 2000; Coleman, 1999; Dooley, 1997; Dooley and van de Ven, 1999; Levinthal, 1991, 1997; Morel and Ramanujam, 1999) and particularly in the fields of organisations, the natural environment and sustainability (Bansal and Gao, 2006; Porter, 2006, 2008; Kallio and Nordberg, 2006; King, 1995; Starik and Rands, 1995; Starkey and Crane, 2003; Marshall and Brown, 2003).

In essence, this chapter makes three distinct contributions to the existing literature. First, it applies complexity theory to the field of strategy and by including a variety of theories and concepts from the wider strategy literature, it integrates and develops a coherent and widely applicable organising framework. Second, by applying the concept of 'rugged fitness landscapes' to the field of environmental strategy, the approach in this chapter presents one of the first of its kind in this particular context. Despite a recently growing body of literature on CAS and sustainability (Porter, 2006, 2008; Rammel *et al.*, 2007), most complexity theory oriented contributions have so far been predominantly made in other areas, such as market competition (Markose, 2005), supply chain management (Choi *et al.*, 2001), invention (Fleming and Sorenson, 2001; McCarthy *et al.*, 2006) and organisational learning (Chiva-Gómez, 2003). I therefore endeavour to apply, and to shed

light on the validity of a, growing theoretical body. Finally, given the growing salience of environmental issues for the commercial world, I develop a dynamic conceptualisation of the interrelationship between corporate strategy and environmental strategy that helps to understand the evolution of an organisation's environmental strategy from a more systemic perspective. The choice of this topic is timely and relevant both for academia and for practitioners, because it addresses the present scarcity of long-term models and studies with respect to why and how firms are actually responding to environment issues. In so doing, it paves the way for future research necessary for improving our understanding of the relationship between businesses and the natural environment.

3.3 ORGANISING FRAMEWORK

3.3.1 CONTEMPORARY THEMES IN CORPORATE STRATEGY RESEARCH

Among scholars there is a growing understanding that far-reaching changes in the global business environment challenge the existing perspectives on strategy, which in turn have become increasingly inappropriate and out-dated (Cheng *et al.*, 2006; Eisenhardt, 2002; Hamel, 1998; Løwendahl and Revang, 1998; Pascale, 1999; Peattie, 1993; Stacey, 1995). Scholars observe the ascent of the knowledge economy (Hamel, 1998), nonlinear, dynamic behaviour in organizations (Anderson, 1999), complex environments fraught with 'wicked' problems (Camillus, 2008), and globalisation as the driving force of the real New Economy (Eisenhardt, 2002). These developments in the new economic playing fields therefore require new perspectives on the understanding of strategy. In the same vein, old scientific approaches toward management ('Taylorism') have been questioned and are being revised in light of various empirical and theoretical developments across all natural sciences and humanities (Freedman, 1992; Hamel, 1998, 2006; Mintzberg, 1994). As Freedman notes, 'far from being as predictable as clock-work, nature appears as random as a throw of the dice' (1992: 7).

This ultimately leads to the question, what actually *is* strategy and in how far does it impact on the way in which we can conceptualise and study the evolution of corporate environmental strategy as proposed in this thesis? Various definitions and characterisations of strategy both as a concept and as an organizational process exist (see for instance Chaffee, 1985; Nag *et al.*, 2007); in the main, they appear to revolve around the dichotomy between the formation of *strategic plans and intentions* on the one hand, and strategy as a phenomenon in the form of *observable, emergent behaviour and outcomes* on the other. One of the most common characterisations includes strategy content and process, but as

Hamel contests, '[…] the planning process doesn't produce strategy, it produces plans – a point that Henry Mintzberg has made on more than one occasion' (1998: 10). It seems that, despite a long history of research and empirical evidence, the definition and understanding of strategy are still ambiguous. Chaffee commented already in 1985, 'the strategy construct is multifaceted, and it has evolved to a level of complexity almost matching that of organizations themselves' (1985: 89). This conundrum is reflected in the multitude of critiques of strategy research within the extant literature (Bartlett and Goshal, 1991; Crook *et al.*, 2006; Pettigrew, 1992; Porter, 1991; Løwendahl and Revang, 1998; Stacey, 1995). One consequence of these critiques has been the introduction of the term 'strategy-as-practice' by Jarzabkowski (2004), which aims to better describe the 'doing' part of strategising and thus to lend it a more dynamic character (Whittington, 2006). Equally, by conceptualising firms as 'organisations in pluralistic contexts' Jarzabkowski and Fenton (2006) attempted to take into account the organisational realities of competing demands and multiple divergent strategic goals. Reflecting these critiques, which equally apply to the relatively static and partial picture of existing environmental strategy conceptualisations, my aim is to analyse the evolving patterns of corporate environmental strategy using concepts and models from what is commonly known as complexity theory (Lewin and Regine, 1999; Morel and Ramanujam, 1999; Stacey, 1996).

3.3.2 COMPLEXITY THEORY

'Complexity science is a haven for positivists and constructivists, and has served as a common meeting place for the different research paradigms. With roots in numerous disciplines, modern theories and models of complex systems, or more specifically, complex adaptive systems (CAS) focus on the interplay between a system and its environment and the co-evolution of both. CAS models extend traditional systems theory by explicitly representing the dimension of 'time' and its related concepts. Internal to a CAS are agents. Depending on the scale of analysis, an agent may represent an individual, a project team, a division, or an entire organization. Agents have varying degrees of connectivity with other agents through which information and resources can flow. Agents possess schema that are both interpretive and behavioral. Schema may be shared amongst the collective (e.g., shared norms, values, beliefs, and assumptions) that make up an organization's culture, or may be highly individualistic. Agents behave so as to increase 'fitness' of the system that they belong to either locally or globally. Fitness is typically a complex aggregate of both global and local states within the system' (Dooley, 2002: 14).

'The emergence of this theory results from the recognition that organizations co-evolve with the environments in ways that in many respects diverge from classical paradigms and converge with complexity theory notions. In this sense, rather than planning and then acting, strategic management is being portrayed as a process in permanent flux, with action and learning feeding back to each other in a succession of iterations' (e Cunha and da Cunha, 2006: 847).

'Complex adaptive systems (CAS) is one name for the large, interconnected systems characterised by these principles, and complexity theory describes in more detail what is known about them to date' (Porter, 2006: 490).

On the theoretical level, complexity theory has a lot in common with general evolutionary theories (Barnett and Burgelman, 1996; Burgelman, 1991; Lovas and Ghoshal, 2000); in addition, however, it fundamentally comprises a much more advanced understanding of change mechanisms. Rather than relying on pure internal and external selection processes (Burgelman, 1991; Hannan and Freeman, 1984) for understanding the creation, evolution, and death of organisations, complexity science combines paradigms of organisational change and inertia including different types of change behaviour, and extends these perspectives by integrating recent findings from a wide range of scientific inquiries into the significance of 'self-organisation', and 'emergence' (Corning, 2002; Kauffman, 1993, 1995a). Repeatedly, this understanding has been referred to in the sense-making processes of synthesising the theories of adaptation and selection (Dooley, 1997; Kelly and Amburgey, 1991; Levinthal, 1991; Stacey, 1995). As Levinthal explains, 'It is in this sense that organizational adaptation and environment selection are not conflicting perspectives on change as suggested by early writings, nor simply complementary views as suggested by more recent literature, but are fundamentally interrelated processes of change' (1991: 144). This remains critical in the development of a dynamic conceptualisation of changing environmental strategies that takes into account the different existing bodies of research. Next, however, I begin by describing an organising framework of the organisational phenomenon 'corporate strategy' based on complexity theory. During its development I will make reference to a broad range of existing concepts, perspectives and theories from the wider academic literature (listed in brackets) that accompany general strategy research whenever they apply and complement this framework.

3.3.3 A COMPLEX ADAPTIVE SYSTEMS PERSPECTIVE OF CORPORATE STRATEGY

The aim of this organising framework is to employ the metaphor of the firm as a 'complex adaptive system' consisting of various individuals, in this case called agents (Dooley, 1996, 1997; Holland, 1995, 2000; Lewin and Regine, 1999; Stacey, 1996). Drawing on metaphors for describing and understanding organisations is a frequently used tool in social sciences. Specifically, Morgan's (2006) 'transformation and flux' metaphor might provide a complementary metaphor to this approach in order to help understanding how the environment and an organisation interact.

A complex adaptive system can usefully be described as having open boundaries to the environment in the sense that there is no impermeable layer separating it (and ultimately its agents) from external influences (Chaffee, 1985; Coleman, 1999; Thiétart and Forgues, 1995). This view does not include physical barriers (such as buildings) and organizational barriers (such as an agent having to be employed in order to formally become part of the system). In the organising framework the term 'environment' refers to the entirety of all surrounding social and environmental influences which an organizational system might possibly become exposed to.

Individual agents within a system possess varying degrees of knowledge (Beinhocker, 2006; Lovas and Ghoshal, 2000) as well as a range of skills including the ability to learn from experience (Cyert and March, 1963; March, 1981, 1991) and the ability to adapt to environmental inputs through cognitive processes. An individual agent's knowledge and skills collectively form part of the competencies of the firm (*resource-based view of the firm*; Barney, 1991; Wernerfelt, 1984), which then through (re-) combinations (Galunic and Rodan, 1998) across the system may result in higher levels of organizational, dynamic capabilities (Eisenhardt and Martin, 2000; Teece *et al.*, 1997).

Agents are influenced by a myriad of environmental inputs and conditions, chief among them the rules in the form of legislative constraints (*institutional theory*; DiMaggio and Powell, 1983), but also to a great extent by having to deal with stakeholder pressures in a variety of forms (*stakeholder theory*; Donaldson and Preston, 1995; Jones, 1995). Stakeholders are one type of 'meta-agents which mostly exist outside the boundaries of the complex adaptive system, and schema determine the rules of interaction concerning how information and resource flow occurs' (Dooley, 1997: 88). In short, 'organizations do not just compete for resources and customers, but for political power and institutional legitimacy, for social as well as economic fitness' (DiMaggio and Powell, 1983: 150). This

multi-faceted view of organisational behaviour has also been conceptualised as part of the 'market and non-market based strategy approach' by Baron (1995).

At the same time, agents are proactively sensing (scanning) their environment (Dooley, 1997; Holland, 1995) for discrepancies between the current and the desired states of the system (the organization) (alignment of external and internal environment, Venkatraman and Prescott, 1990; market position and five forces of competition, Porter, 1979). This scanning routine involves a complex process of improving both local (personal) and global (organizational) fitness with the environment and is based on both interpretive and behavioural schemata (Dooley, 2002). In other words, agents seek all sorts of economic opportunities and intangible benefits both for themselves and for their organization. Depending on their position and role within a company an agent will seek a multitude of issues to capitalise on. As a result, agents are trying to adapt to the changing landscape of their personal surrounding environment by improving their own and their firm's fitness with a co-evolving landscape (Hamel, 1998). This is also consistent with the notion of 'bounded rationality' (March and Simon, 1958) in which agents' inability to forecast the system-level consequences of their individual choices often leads them to optimise their own fitness, rather than that of their organization (Hamel, 1998). Cyert and March further elaborate, 'To assume that organizations go through the same processes of learning as do individual human beings seems unnecessarily naïve, but organizations exhibit (as do other social institutions) adaptive behaviour over time. Just as the adaptations at the individual level depend upon phenomena of the human physiology, organizational adaptation uses individual members of the organization as instruments. However, we believe it is possible to deal with adaptation at the aggregate level of the organization, in the same sense and for the same reasons that it is possible to deal with the concept of organizational decision making' (1963: 123).

At all times individual agents engage in sense and decision making processes which entail highly political, diplomatic, competitive and cooperative (Peattie, 1993; *game theory*; Camerer, 1991; Saloner, 1991) individual actions and interactions (Dooley, 1997) in form of constantly acting with reference to agents' own personal strategies/enacted behaviours (for example, money versus leisure; inspiration and anxiety; conformity and individualism; leadership and 'followership'; consciousness and self-awareness; Stacey, 1996: 186). Agents participate in and work through informal networks (*behavioural theory of the firm*; Cyert and March, 1963), which in turn increase the overall complexity of the system. For instance, agreeing on budgets and promotions, championing new investments and projects,

devising and prescribing new operating standards, bargaining, issue selling (Andersson and Bateman, 2000; Bansal, 2003; Dutton and Ashford, 1993), constituency building (Lord, 2003), setting constraints, group think (Janis, 1982), learning and adaptation (Cyert and March, 1963), repetition, innovation, and mimicry (DiMaggio and Powell, 1983) are all (based on) interactions which lead to highly complex behaviour within the system and thus to different emerging patterns at the organisational level. As Beeson and Davis conclude, 'Organizations are constituted by people, not particles. Change is produced not by the complex interaction of effectively structureless atoms, but by the meaningful and value-laden interaction of already complex individual human beings' (2000: 181). As a result of varying input conditions (that is, changes in the fitness landscape) and interactions in form of competitive and cooperative behaviours due to power-relationships and hierarchies agents create a continuous, collective and complex 'game'. This game manifests itself and emerges in the form of the overall firm strategy behaviour both through agents' interactions and as driven by their individual decision-making and adaptation. The overall outcome of these interactive relationships appears in the form of enacted and observable collective behaviour of the system/organization, which is exhibited and thus commonly perceived as corporate strategy, or in other words, the way in which an organization emerges and in which it 'displays patterns in actions over time' (*complex systems theory*, CAS; Hamel, 1998; Lewin and Regine, 1999; Mintzberg, 1978). E Cunha and da Cunha summarise this thus, 'Organizations become what they are as the result of a myriad interactions occurring inside the organization, outside the organization, and at the borders between the organization and its environment. […] Organizations adapt through response and interaction rather than through analysis and reflection' (2006: 840). In essence then, this proposed framework conceptualises strategy as 'an emergent phenomenon' where what the organization is displaying/doing at *any* point in time represents the emerging patterns of action.

This view firstly acknowledges the significance of *all* of the system's agents in playing part in the collective behaviour/strategy of the firm, and secondly, it redefines strategy not as simple game plan devised by senior management in isolation and always just in periodic intervals – although this is certainly to a great extent happening. Instead, strategy is 'organization-wide behaviour', which is generated and resides in the continuous and dynamic processes of interaction of individuals endowed with varying competencies. Strategy is therefore a combination of deliberately and top-level developed initiatives as well as the self-organising and emerging behaviour originating from political, diplomatic, cooperative and competitive processes between all agents in the system with different

inputs and power (Beeson and Davis, 2000; DiMaggio and Powell, 1983; e Cunha and da Cunha, 2006; Peattie, 1993).

Because of the unstable, nonlinear nature of interactive relationships (feedback mechanisms; Black and Farias, 2000; Mason, 2007; Stacey, 1995), and due to shifting environmental conditions, which are equally believed to display complex adaptive systems behaviour rather than resting in stable equilibria (Gell-Mann, 1995; Mason, 2007), the strategy of the system (that is, its collective behaviour) becomes even more complex and remains a dynamic, emergent phenomenon, a 'pattern in a stream of decisions' (Mintzberg, 1978), rather than a steady-state feature. Since the environmental conditions fluctuate with time and depend on a number of moderating aspects strategy becomes a dynamic process and needs to be studied longitudinally. As Mason states, 'The process is not controlled by an outside party or 'manager', but spontaneously self-organises from the bottom up through the inter-relationships of the system's parts' (2007: 12).

Although the literature commonly refers to strategy formulation and implementation, I believe that, viewed from a complex adaptive system's perspective, strategy can usefully be broken down into two core building blocks: *competencies* (knowledge and skills) and *interaction* (adaptation, competition and cooperation), both among agents and with their environment. This framing gives the term 'strategy' a revised understanding by transforming it from 'what each agent ideally wants to happen' to the level of 'what is *actually* happening/has actually happened' (observable, displayed, adapted, and emergent behaviour). As Dooley comments, 'An organization's actual state is essentially hidden in its complexity as a whole from any single person's view, exceeding human perceptual, intellectual, and analytical capacities. The perceived organizational state is an amalgam of images, stories, thoughts, beliefs, and feelings. The desired state is driven by and feedbacks to a 'shared vision.' The difference between the perceived organization state and the desired organizational state creates a 'state gap.' The state gap motivates or demotivates an individual's readiness for change' (1997: 90).

3.4 THE EVOLUTION OF CORPORATE ENVIRONMENTAL STRATEGY

Based on and consistent with the organising framework described above, I am now going to outline a more specific conceptualisation of how organisations change their corporate environmental strategy based on the concept of 'adaptive walks across the changing fitness landscape' (Kauffman, 1993). Support for the approach of this conceptualisation comes

from the definition of environmental strategy, which is inherently dynamic by making explicit reference to strategy as '*outcomes'* (Sharma, 2000), as opposed to plans, documents, and intentions. Even though these organizational outcomes are commonly and conveniently 'measured' and observed only at certain cut-off points (end of financial year, quarterly, bi-annually), the actual emergent behaviour is ever-present; strategy is therefore an on-going and dynamic phenomenon or process. Importantly, the framework also recognises the both partly compulsory (legal constraints) and partly voluntary (economic opportunities) nature of emerging behaviour. Although it is ultimately the individuals who are exposed to a multitude of environmental influences, the aim is to focus on the firm-level emergence of changes in environmental strategy.

A core component of this conceptualisation and indeed of complexity theory in general is the concept of 'rugged fitness landscapes' (Kauffman, 1993, 1995b). I will explain how this fitness landscape influences a firm in more detail hereafter. The concept has been devised in the context of biological evolution (Kauffman, 1993) but has already been applied to, among many others, strategy (Beinhocker, 1999; Caldart and Ricart, 2004; Levinthal, 1997; McKelvey, 1999; Rivkin, 2000), innovation (Kauffman, 1995a) and organisational design (Levinthal and Warglien, 1999). Of significance in this conceptualisation is the term of evolution, which we commonly understand as some form of longitudinal development, or as 'any process of formation or growth'[3]. More specifically, however, Beinhocker argues 'we can think of evolution as the process by which species (or businesses) search for high points in their fitness landscape' (1999: 98).

Essentially, '*complex adaptive systems evolve in such a manner so as to maximize some measure of 'goodness' or fitness in a dynamic environment. The potential states that a system can attain can be represented by a 'landscape', where the coordinates on the terrain represent the organizational configuration, and the height of the terrain represents fitness. The highest point in this landscape and its associated fitness value could be considered the optimal state for the system. When the organization's fitness landscape is simple—e.g. single-peaked—it is relatively simple to optimize organizational performance. Managers must determine which factors are important, and how those factors should be configured so that an overall organizational configuration best matches the contingencies of the environment. If, however, the landscape is multi-peaked, with many local optima,*

[3] Evolution. (n.d.). *Dictionary.com Unabridged (v 1.1)*. Retrieved July 17, 2008, from Dictionary.com website: http://dictionary.reference.com/browse/Evolution American Psychological Association (APA)

then organizational optimization becomes difficult. Such complex, or 'rugged landscapes' exist in problems where optimality of the organizational system is determined by tightly coupled components. When elements of the organization can be optimized individually without regard for one another, and this leads to global, systemic optimality, the landscape is simple (single-peaked). When individual components of the organization contribute to overall organizational fitness in different ways, depending on the value/state of other organizational components in a contingent manner, the optimal organizational configuration becomes difficult to find, as many configurations that 'satisfice' exist. Thus, similar to Perrow's formulation, an organization (or its environment) is considered complex to the extent that its constituent elements are interdependent upon one another' (Dooley, 2002: 17).

Based on this definition of rugged fitness landscapes, I begin with the core assumption that a commercial organisation can only evolve by making a profit *and* securing its (long-term) survival (Coleman, 1999); in other words, an organisation is 'trying' to maximise its organisational 'fitness', which comprises both 'economic and social fitness' (DiMaggio and Powell, 1983). This key assumption is based both on the shareholder wealth maximisation theory (Friedman, 1970) for profit *and* on the understanding that survival is not only a corollary of a firm's profit, but also of a host of other non-financial factors as exemplified by the concepts of market and non-market strategies, obtaining legitimacy vis-à-vis stakeholders and general legislative compliance (Baron, 1995; Carroll, 1979; DiMaggio and Powell, 1983). For instance, with respect to environmental strategy Bansal and Roth (2000) identified three main managerial motivations for why firms were 'going green': competitiveness, legitimation, and social/environmental responsibility. I believe, however, that at the meta-organisational level – potentially unbeknownst to the individual, or at least not specified and justified in such a manner – social/environmental responsibility contributes together with legitimation to organisational fitness, and both aim to ensure firm survival more specifically.

Fundamentally, firms can only evolve by trying to maximise their chances of survival and growth; otherwise they quickly cease to exist. When viewed from this perspective, all efforts in the wake of organisational evolution should (ideally) be directed towards making a contribution to maximising organisational fitness; but because individuals within a firm sometimes either focus too much on local (i.e., personal) fitness, or because they do not/cannot interpret the (commercial and natural) environment correctly and consequently misjudge inherent causes of fitness reducing factors, organisational behaviour may display

what might for an outsider appear to be short-term irrationality and even short-term but ultimately self-destructive altruism. The key here is thus to stress that organisations, as wholes, 'attempt' to maximise fitness. That is not to say that in the path of their efforts towards this aim they may sometimes achieve completely the opposite. Profit and survival, whilst strongly interrelated, are therefore not identical drivers but both form integral parts of a firm's fitness (Anderson, 1999).

Consequently, Cyert and March (1963) argued that rather than being able to maximise a certain goal (such as fitness) various individuals and groups within an organisation tend to only 'satisfice' their goals. For the purpose of this conceptualisation, however, I assume that, on the whole, the organisation strives towards maximising its fitness, and this overall fitness of the organisation is determined by a wide-ranging, interrelated set of elements (Rivkin, 2000). As Levinthal and Warglien concur, 'The attributes that determine fitness for an organization may comprise of elements of its business strategy, its human resource policy, manufacturing system, and so on. Fitness can be represented by profit, or by a mix of variables related to the organization's goals' (1999: 344). As I have argued in the organising framework, corporate strategy is an emergent phenomenon in the form of organisational behaviour, which in turn can be conceptualised as agents' adaptive response mechanism to their changing fitness landscape (Hamel, 1998; Mintzberg, 1978, 1994; Stacey, 1995). Therefore, collectively, agents are trying to adapt to this changing fitness landscape in order to guarantee profit and survival, even if this behaviour may be differently enacted at an agent's individual or group level. As Levinthal and Warglien explain, 'Actors are assumed to be intelligent, but that intelligence is local to their position on the landscape. Thus, actors are assumed to be able to identify the positive and negative gradients around their current position, but not capable of making similar judgements for more distant locales' (1999: 345).

This adaptive behaviour also has important consequences for both the organisation and the environment and is commonly summarised in the concept of 'co-evolution' (Kauffman, 1993, 1995b; McKelvey, 1999; Porter, 2006) whereby 'Organisations shape their environments by influencing their industries or collaborating with each other, thereby gaining some control over some part of their environments. The environment is thus not completely determined by external forces, but can also be influenced by the firm' (Mason, 2007: 11). Porter (1979) covered this aspect to some extent in his more static model of the impact of the market position among the five forces of industry competition. The effects of constant co-evolution between organisation and its environment have a significant impact

on the fitness landscape. As Beinhocker illustrates, 'The landscape is not fixed, like a mountain range, but is constantly bucking and heaving. As the environment and the strategies of competitors change, the fitness attributable to any given potential strategy will also change. So the height of any particular point on the landscape is moving up or down over time. What is successful today may not be successful tomorrow' (1999: 98).

Ultimately, the fitness landscape varies from firm to firm over time, but similar firms in terms of industry sector and size may have similarly shaped fitness landscapes because of certain shared and relatively fixed features of their environment such as, for instance, industry regulation. The fitness landscape of an organisation is a function of several determinants of which responses to environmental issues are only one out of many factors. More specifically, a variety of economic and institutional variables all shape an organisation's particular fitness landscape within which it is trying to find the optimum strategy configuration in order to maximise its fitness. Thus, an organisation's fitness landscape is the ultimate selection mechanism of its internal fitness and hence determines profit and survival chances.

'Evolution is sometimes characterised by biologists as a metaphorical uphill struggle across a 'fitness landscape' in which mountain peaks represent high 'fitness', or ability to survive, and valleys represent low fitness. As evolution proceeds, a population of organism in effect 'takes an adaptive walk across such a landscape'' (Kauffman, 1995a: 122). And Beinhocker further states, 'Fitness landscapes can take various shapes…In most complex systems, whether biological or business, the landscapes have lots of peaks and valleys, but the heights of different points on the landscapes are correlated so that strategies differing slightly are near each other and have similar fitness levels' (1999: 98). The 'rate of finding improvements slows exponentially as 'peaks' of fitness are approached…Adaptation can be seen as the attempt to optimise systems riddled with conflicting constraints' (Kauffman, 1995a: 121). An exemplary model of a static three-dimensional model of a 'rugged fitness landscape' is shown in Figure 10 further below.

As a case in point then, environmental issues can affect an organisation's fitness landscape both in positive and negative ways. A firm's environmental strategy, therefore, is adaptive organisational behaviour in response to environmental issues impacting the fitness landscape. This view does not preclude the possibility that an organisation can also voluntarily make significantly proactive steps in its environmental strategy if it perceives of such actions as having the chance of maximising its fitness in the given (or in a future)

fitness landscape. However, since environmental strategy is only one of many coupled determinants of the overall fitness of the firm, other factors may override or reverse its environmental strategy in order to maximise profit and guarantee survival.

To summarise, changes in corporate environmental strategy can thus be construed as responses to changes in the overall fitness landscape, or more specifically either as threats to, or opportunities for improved organisational fitness. By having to adjust to this changing fitness landscape the organisation needs to make adjustments in all the constituent parts of its corporate strategy of which its environmental strategy represents only one of many interrelated constituents. Several aspects of this conceptualisation are worth re-emphasising. 1) I do not assume that corporate strategy is conceptually the same as environmental strategy; instead, responses to environmental issues are subordinated to an organisation's central purpose (the 'simple rule') and these responses are designed to adjust to the changing organisational fitness landscape. This conceptualisation therefore allows non-linear variation in both positive and negative directions of corporate environmental strategy. 2) Environmental strategy is coupled to other functional strategies, policies and attributes within the organisational context, which impedes the search for optimal solutions. 3) It includes the notion that the fitness landscape is shaped not only by an organisation's evolution in the form of 'adaptive walks', but also by the constantly changing forces of co-evolution with its business environment (competitors, regulators, stakeholders, etc.). Furthermore, by explicitly including time in this model a dynamic model results and thus allows for the longitudinal development of corporate environmental strategy. 4) Change occurs both through *adaptation* at the organisational level in response to optimising a firm's fitness function, and through *evolutionary selection* processes at the field level. The ability to find optimal strategy configuration solutions to a changing fitness landscape influences a firm's ability to survive and prosper. Conversely, new firms emerge that may be better suited for such environments and, given the death of unsuccessful organisations, it is those new firms that begin to dominate the population. Thus, organisational change within a population has two origins: First, it is the result of exogenous factors impacting the firm's fitness, which may require adaptation on the firm's behalf or which can occur deliberately in expectation of and preceding a changing fitness landscape. Second, on the other hand the forces of natural selection operate at the population level leading to the death of firms unfit to survive and prosper in their respective fitness landscapes. Adaptation and selection are thus 'fundamentally interrelated processes of change' (Levinthal, 1991: 144) and both leadership and agents' interaction are

responsible for organisational evolution with respect to corporate (environmental) strategy (See Figure 11, below).

Figure 10: Model of a 'rugged fitness landscape'

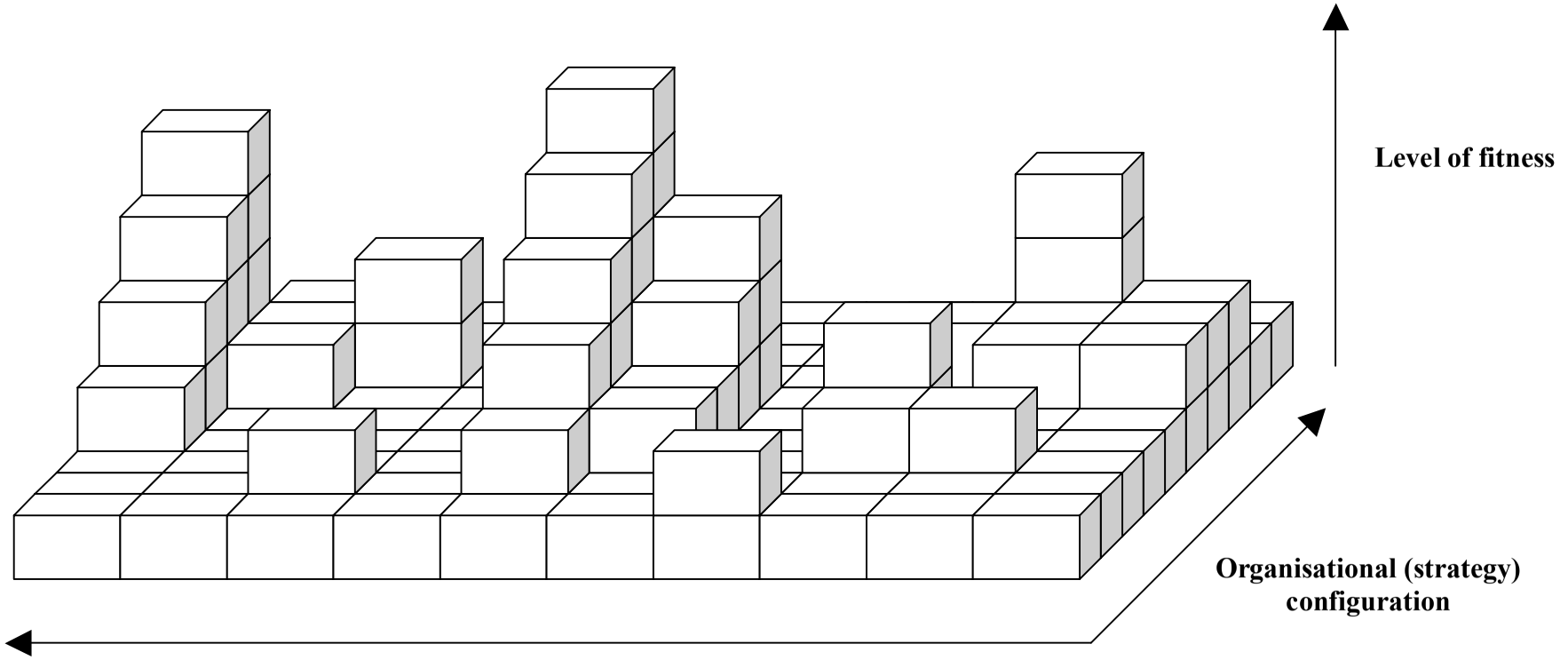
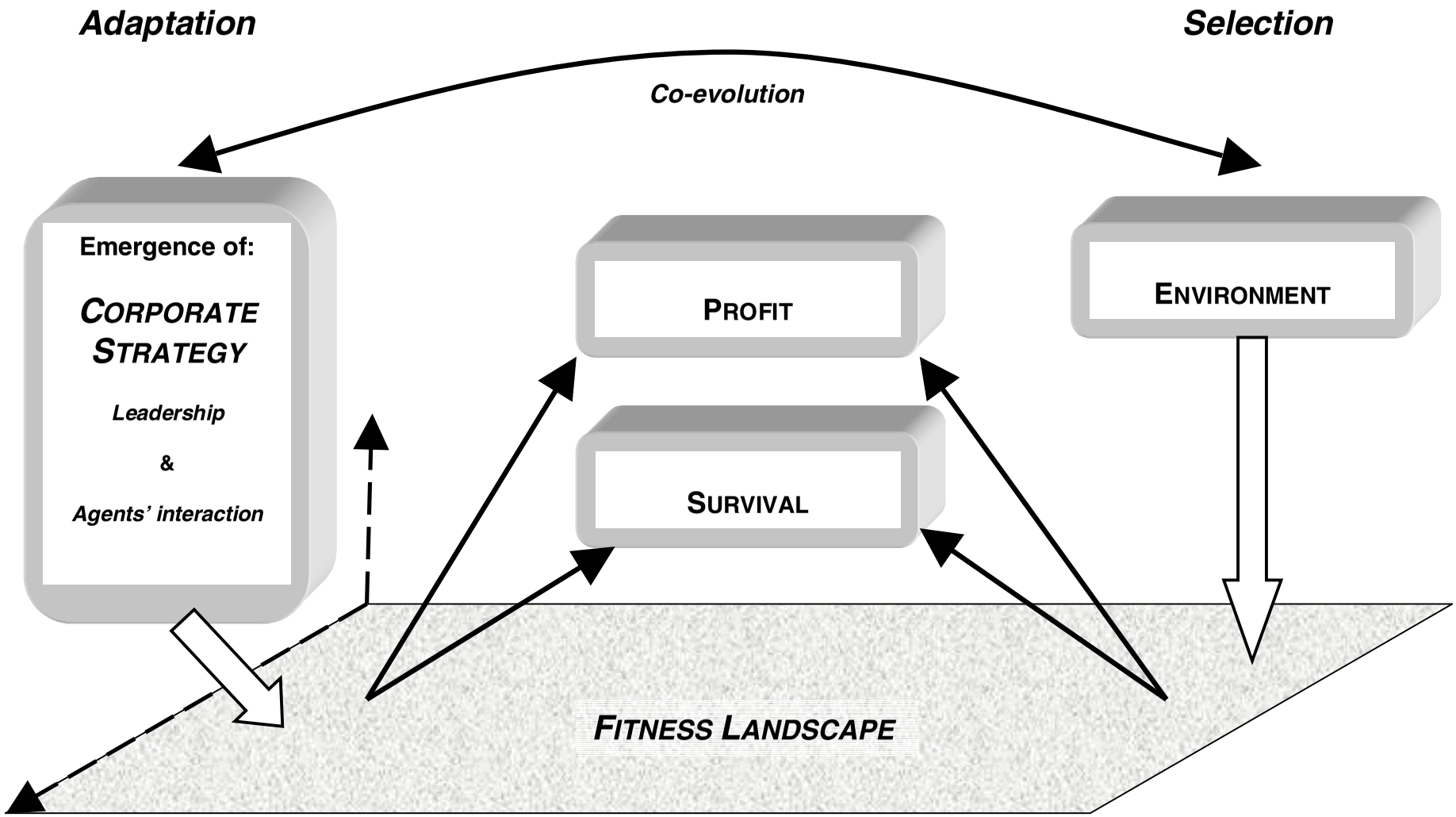


Figure 11: Model of the interaction between adaptation and selection



3.5 IMPLICATIONS

The theoretical organising framework presents a novel approach for illustrating the emergence of corporate strategy from a complex adaptive systems perspective. As such, it has far-reaching implications for the definition of strategy as the emphasis is placed on the significance of organizational behaviour, or outcomes, rather than straightforward plans and intentions. Therefore, in response to recent critiques in the strategy literatures, I have attempted to address the divergence between strategy-as-practice (Jarzabkowski, 2004), strategic planning and organisational behaviour (Hamel, 1998; Jarzabkowski and Fenton, 2006; Peattie, 1993; Whittington, 2006). I do not claim that strategic planning is irrelevant, and yet, the framework stresses the role of potentially *every* agent's actions and interactions in the overall process that together induce the emergence of corporate strategy. In that respect, (senior) managerial leadership only represents one particular group of agents within the whole system.

In addition, the conceptualisation has argued that the emergence of corporate environmental strategy is the result of a simple principle – in this case the purpose of maximising organisational fitness in the form of survival *and* profit – which leads to complex behaviour. More specifically, it is the result of complex adaptive systems (here companies) searching for peaks on changing 'rugged fitness landscapes'. Furthermore, in order to understand the nature and evolution of corporate environmental strategy it is absolutely crucial to acknowledge its coupled existence with other functional strategies and attributes as part of a firm's corporate strategy. Thus, through the application of complexity theory, I have developed a conceptualisation of environmental strategy, which takes into account its largely systemic and dynamic nature.

I have tried to demonstrate how agents with varying (normally bounded) knowledge and skills act through the use of behavioural and interpretative schemata, which in turn influence the collective interactions and thus the outcomes of the system. When strategy is viewed through this framework, it becomes possible to assess what impacts this has on our understanding of changes in (environmental) strategy and how these changes happen. Acknowledging the ever-growing importance of environmental issues for our global society in the 21st century, it is unlikely that we can expect a slow-down in interest and pressures from various actors and stakeholders any time soon (if at all).

Based on this conceptualisation, several points arise that provide fertile ground for future research. In particular, these issues form the theoretical background to the empirical research in this thesis and will be addressed and tested in the subsequent Chapters 5 to 8. Of key importance is the question, what can we say about environmental strategy and the character of its evolution? And what drives this strategic change? Complexity theory generally challenges the notion of predictability, which is why it is necessary to shift the level of attention to more general patterns of behaviour, predominantly to the higher levels of an entire population or at least specific industry sectors.

Given the rising significance of environmental issues as represented by economic, social and institutional factors (Ambec and Lanoie, 2008; Waddock, 2008), companies' fitness landscapes are constantly changing and, therefore, changes in environmental strategy are becoming necessary in order to maximise organisational fitness. And since these changing and intensifying factors are (at least to a certain degree) global phenomena, to a degree all firms within a population are likely to be affected by these changing fitness landscapes. As a result selection forces at the population level should have some visible impacts on the composition of this population. For instance, with widespread changes in the fitness topography occurring, certain companies will now be favoured by this new fitness landscape, and they are therefore likely to increase their relative presence among this population of companies. In other words, one would expect that a population of companies is likely to be progressively more composed of organisations that are a) generally better adjusted to this environment (that is, they have greater proactive, or at least compliant, environmental strategies), and b) stem from industry sectors which are favoured by this environment (for instance, IT, renewable energy, advanced electronic and manufacturing). To summarise, across different industry sectors a population of firms will become increasingly more proactive in corporate environmental strategies given that the system level (that is, economic, social and institutional) conditions are changing with direct effects on firms' fitness landscape. More specifically, this change in environmental proactiveness is the result of both firms' adaptations and selection forces increasing the number of fitter (in this case, more proactive, or at least compliant) companies. This does not exclude the possibility for firms to occupy niches such as noncompliant or extremely proactive environmental strategies if they can successfully maintain such levels.

> ***Proposition 1:*** A cross-industry population of firms will become more proactive in its environmental strategies over time.

More specifically, however, a population of firms consists of a number of heterogeneous organisations (especially, among others, in terms of organisational form, size, industry sector, extent of multi-nationality, and age), each with its own, individually changing and co-evolving fitness landscape. Therefore, the degree to which a firm's environmental strategy changes over time will vary between firms. Hence, it can be argued that for a population of firms corporate environmental strategy will follow different patterns of longitudinal development insofar as that there is no one single pattern of evolution for all firms. For instance, Aragón-Correa and Rubio-López (2007) aimed to illustrate the significance of contingency with respect to proactive environmental strategies in the sense that they depend on a firm's particular circumstances, its capabilities and its respective stakeholder interests. As a result, individual longitudinal developments may resemble patterns, such as a strong tendency towards compliance; small, incremental improvements; sudden, large-scale improvements; unstable long-term behaviour; persistent non-compliance; or even the (slow) worsening in environmental strategy. These characterisations of environmental strategy behaviour would fall broadly in line with Burgelman's (1991) strategic perspectives of (change) patterns, such as inertia, adjustment, reorientations and strategic renewal. However, since Burgelman's (1991) strategic perspectives are evolutionary developments at the corporate level rather than of functional strategies, due care has to be taken in the interpretation of these patterns.

> ***Proposition 2:*** Different firms within a population evolve through and thus display individually different (change) patterns with respect to environmental strategy.

At the same time, though, firms within the same industry sectors share important aspects of their fitness landscape, at least to the degree that they are operating within the same regulatory and institutional framework. It is therefore likely that these firms have to respond to similar environmental issues in a similar fashion (Hoffman, 1999; Rothenberg, 2007). Another factor, which can influence the firm's fitness landscape and which can thus facilitate or impede the pattern of organisational change, is firm size. As Bansal (2005), Bowen (2002), Clemens (2006), Gadenne *et al.* (2009) and Sharma (2000) have argued, slack, visibility and different capabilities as a result of varying firm sizes can have a significant effect upon firms' fitness landscapes and thus their environmental responsiveness over time. More specifically, it is possible that there is a certain 'ordering effect' among these firm characteristics, which has a direct impact on firms' environmental strategies in terms of their comparability. Most important in this context would be whether firms operate in the same or similar industry given that sectoral characteristics influence,

for example, whether firms operate in environmentally-sensitive or energy-intensive industrial settings (Cho and Patten, 2007; Miketa, 2001). This effect is likely to be strengthened the more similar firms are in terms of size on account of the inherent variables listed above. Last, firms in different industries but of similar size may to a lesser extent share communalities in terms of their fitness landscapes and hence react in a similar manner to environmental issues, although such responses would be mainly contingent on industry sector and other influences.

> ***Proposition 3:*** A firm's industry sector and size have significant impacts on the evolution of its environmental strategy. The role of each factor in affecting patterns in environmental strategy is subject to an 'ordering effect' with industry sector being of greater significance than firm size. Combinations thereof are subject to the same hierarchy.

But why is it that firms' fitness landscapes are changing? What determines which (change) pattern of environmental strategy a firm displays? And how do firms and their fitness landscapes interact so that evolution can take place? The conceptual framework has highlighted that a range of factors determine and affect the fitness landscape of a firm and so provide the origins of the evolution of corporate environmental strategy. These factors heavily impact upon the topology of a firm's fitness landscape, or more precisely they provide powerful motivations, such as opportunities and threats, to follow the simple rule of the organisational existence (satisficing survival and profit).

A changing business environment is represented by the varying salience of factors, such as increasing pressure from social movements, customers, the media and other stakeholders (Bansal, 2005; Buysse and Verbeke, 2003; Kassinis and Vafeas, 2006; Klassen and McLaughlin, 1996; Murillo-Luna *et al.*, 2008), the introduction of new and stringent legislation, regulation and taxation (Rugman and Verbeke, 1998a, 1998b; McKay, 2001; Nehrt, 1998; Porter and van der Linde, 1995; Rothenberg, 2007) as well as the introduction of industry standards (Clemens and Douglas, 2006; Howard *et al.*, 2000; King and Lennox, 2000), the growing need for better risk management (Sharfman and Fernando, 2008), and competitors' innovative behaviour (Rothenberg, 2007). This commercial environment favours certain business strategies, which then suddenly become profitable or necessary for survival (Venkatraman and Prescott, 1990). More specifically, where the fitness landscape changes, so that the economic and social payoffs to particular strategic configurations increase (for instance, from materials recycling, exploring new markets of environmentally

beneficial products and services, incurring reduced levels of fines, various organisational benefits from implementing an environmental management system, reputational and commercial benefits from proactively engaging with climate change), there are likely going to be relatively more improvements across the population of organisations. Thus, in other words, exogenous factors, and chief among them economic and institutional variables, impact upon firms' fitness and thus trigger changes in environmental strategy.

> ***Proposition 4*:** Over time, more environmentally proactive strategies are positively related to increasing fitness payoffs anticipated and realised from such strategies.

At the same time, the very existence of such powerful motivations due to a changing fitness landscape is in itself not entirely sufficient to initiate organisational change with respect to environmental strategy. As elaborated in the conceptual framework, organisations consist of individuals with 'bounded rationality' who interact with themselves inside the organisation and due to the open boundaries also with their external environments. Individuals at all levels are the receptors of any changes in the topology of the fitness landscape are therefore directly affected by these changing motivations to act, mainly because they embody the interface between the system and the changing business environment. Mason (2008) summarises his complexity theory based advice on management in changing environments thus: It 'should be organic, with managers concentrating on creating an internal environment conducive to co-evolution. Decision-making should be decentralised, learning and experimentation facilitated and change encouraged. Management must provide information to support this approach, encourage informal information gathering, and control through self or group control' (Mason, 2008: 41).

Much, however, depends on individual agents' personal values, emotions and attitudes towards environmental issues (Bansal, 2003; Bansal and Roth, 2000; Branzei *et al.*, 2004; Cordano and Frieze, 2000; Fineman, 1996; González-Benito and González-Benito, 2005; Kilbourne *et al.*, 2002; Minton and Rose, 1997), their knowledge and skills (Andersson and Bateman, 2000; Rothenberg, 2003, 2007) as well as their perceptions (Fineman and Clarke, 1996; Henriques and Sadorsky 1999; Sharma, 2000) of the changing fitness landscape in the first place and accordingly, their ability to anticipate the ensuing impact on organisational fitness (Lewis and Harvey, 2001). Furthermore, there needs to be an adequate level of executive discretion and slack to respond and to initiate action (Aragón-Correa *et al.*, 2004; Bansal 2003; Judge and Douglas, 1998; Sharma, 2000), a sense of

empowerment and supervisory support (Ramus, 2001; Ramus and Steger, 2000), and finally, the mutual interaction between private and work lives may or may not equally affect an individual's sense of having to respond to environmental issues (Fineman, 1997). In effect then, individuals can significantly shape the evolution of corporate environmental strategy depending on a variety of personal attributes and character traits. This becomes all the more important if the particular individual is formally in charge of environmental responsiveness within the firm (Rothenberg, 2007).

> ***Proposition 5*:** Individuals at all levels of the organisation play a key role in initiating and affecting a firm's environmental strategy over time.

Finally, one of the core ideas behind the rugged fitness landscape is the level of coupling or interconnectivity of attributes (genes in the original context), also known as 'epistatic effects' (Levinthal, 1997). This level of coupling has distinctive mathematical effects on the overall topology of the fitness landscape and determines average levels of fitness as well as the difficulty for finding peaks on the fitness landscape. As Kauffman illustrates,

'In an adapting system of many parts, either those parts are fully independent of one another or they are coupled together. In the limiting case where the parts are independent, each part typically makes, to the overall function of the system, a contribution which decreases in relative importance as the total number of parts in the system increases. ...At the opposite extreme, the parts are richly coupled. But in this case common experience suggests that conflicting design constraints make it difficult to achieve overall success…such conflicting constraints lead to an adaptive landscape which becomes more multipeaked as the number of parts increases. Thus adaptation, which must search such rugged landscapes, tends to become trapped in very small regions of space. Worse, due to the increasing number of conflicting constraints, the peaks become ever poorer compromises among those constraints, withering to mere bumps hardly better than chance agglomerations of the parts' (1993: 36).

'What underlies the 'ruggedness' of the landscape? Multiple peaks are the direct result of interdependence among a set of actors or policy choices. With a high degree of interdependence, a change in a single action may appear dysfunctional (i.e., diminishing performance or fitness) despite the fact that a simultaneous change in a large set of actions may enhance performance' (Levinthal and Warglien, 1999: 344).

Coupling in this conceptualisation means that the actions a firm takes in response to (or proactively for) environmental issues are organisationally and operationally linked to other functional strategies and organisational attributes. For instance, achieving regulatory compliance requires financial and other resources, but the costs for non-compliance normally exceed such investments at least in the mid- to long-term. Conflicting design constraints may also occur, for instance, when an organisation is trying to achieve corporate growth but at the same time is forced to reduce its emissions. This, in turn, means that finding optimal, or at least satisfying, solutions at corporate level to environmental issues becomes more difficult. Support comes from Bansal and Roth's findings stating that 'a corporation's ecological agenda often competes with other functional resources. Further, the multiple contextual conditions and motivations permit a wide range of possible initiatives or organizational responses' (2000: 732). Since environmental strategy is only one of many coupled determinants of the overall fitness of the firm, organisations have to find difficult solutions to conflicting constraints and other factors may override or even reverse its environmental strategy in order to maximise profit and guarantee survival. In essence then, organisations seek to improve their fitness of economic profits *and* survival, but all decisions and actions with respect to environmental strategy are subordinated to this fitness. As a result, this leads to a situation in which agents struggle to find global (that is, organisational) optimal solutions to environmental strategy in relation to other functional strategies and as part of the corporate strategy configuration. Environmental issues therefore frequently stand in conflict with other organisational requirements as part of the wider corporate strategy configuration.

> ***Proposition 6:*** Firms are trying to find the optimal contribution that an environmental strategy can make towards satisficing organisational fitness by integrating it to the degree that best suits this cause in their particular fitness landscape.

While this chapter was designed towards an analysis of environmental strategy, I believe that other functional strategies would fit this conceptualisation just as much and it could therefore lay the foundation of future research in the field of corporate strategy. The emerging field of complexity theory harbours a rich theoretical background for a variety of organisational research problems, and I hope to have contributed to and initiated a stream of new research that builds on this new fascinating scientific insight and literature. Given unprecedented challenges with the natural environment, understanding how organisations

contribute to them in both positive and negative ways forms a first step in solving such complex problems.

3.6 CHAPTER SUMMARY

This chapter has argued that companies can be viewed as complex adaptive systems whose agents, endowed with skills and bounded knowledge, act and interact based on schemata designed to interpret the internal and external environment of the organization. These cooperative and competitive interactions enable agents to improve their local and global fitness and thereby bridge the gap between current and desired states. As a result of this complex behaviour an organization's corporate strategy emerges. Further, I have suggested that environmental strategy is not a special case of general strategy, but rather reflects only one of many corporate strategy components, which together determine a firm's fitness. By drawing on the organisational metaphor of 'rugged fitness landscapes', I have developed a dynamic and systemic conceptualisation of the evolution of corporate environmental strategy within which agents attempt to satisfice organisational fitness consisting of survival and economic profit. Finally, several research propositions have been elaborated with the aim to be exposed to empirical validation in the following chapters of this thesis.

CHAPTER 4: METHODOLOGY

4.1 INTRODUCTION

In this Chapter 4, I describe and justify the methodology used for the research in this thesis based on the outcomes of the literature review and on the theoretical framework as outlined in the previous two chapters. More specifically, this chapter serves as a foundation for the following four empirical chapters by illustrating how the various aspects of the research fit together, and how the research was planned and executed. The aims of this chapter are:

- To describe and justify the overall research design rationale behind this thesis;
- To outline which sampling strategy was employed and how the data was collected;
- To justify the choice of methods applied for analysing the data.

4.2 RESEARCH DESIGN

Given the conclusions of the literature review and the articulation of the preceding theoretical framework, it was important to choose a research design that allowed for the logical, rigorous and insightful testing of its validity with respect to its ability to make meaningful and correct predictions in terms of the state and the evolution corporate environmental strategy. However, a couple of challenging issues shaped the formulation of the ensuing research design. The first major issue was the resource constraint in form of availability of time. While cross-sectional studies do not normally pose any problems in terms of time, undertaking a longitudinal study as dictated by research into evolutionary processes usually requires longer observation periods in order to draw insightful conclusions of long-term trends. Time was therefore of the essence. The length of available research funding for the thesis, however, limited this potential observation horizon to a great extent and an appropriate way of restricting the research to the time available had to be found.

In line with the previous issue were also considerations with respect to the choice of the unit of analysis. So far, the motivation for and theoretical conceptualisation of this research referred to firms' longitudinal trends of their environmental responsiveness. Such behaviour may, of course, also include strategic developments that stretch beyond individual firms such as supply chain based initiatives, strategic alliances across industries to tackle common environmental problems as has happened in the chemicals and electronics industries, or strategic alliances with NGOs and other types of organisation. Likewise, it may entail the evolution of different parts of an organisation, which may or

may not change over time at the same rates in terms of their responsiveness to environmental issues and willingness to adopt environmental management practices. Similar to the point above, however, it was important to make a decision with respect to the research setting and unit of analysis. Accordingly, given the limited availability of time and other research resources, I decided to focus on firms in their entirety as the sole unit of analysis rather than extending the research into strategic areas of development, or investigating intra-firm behaviour differentiated by department over time. This resulted in a drawback to the research, which may offer fruitful future avenues of study.

A final concern was that the conceptual framework is based on complexity theory for which currently a great deal of research is conducted in form of computer models and simulations. These simulations have led to truly remarkable insights into the concepts of emergence and the behaviour of complex adaptive systems in general; however, they are often also contested as a scientific means of testing theory (see Davis *et al.*, 2007). Still, given the predominantly simulation-based character of extant research in this area, one of the aims of this thesis was to expand research into complex adaptive systems by employing more traditional research methods as far as was reasonable and possible (see also Mason, 2007, 2008). This would therefore allow the empirical testing of aspects of complexity theory by drawing on real-life data rather than abstract simulations.

To that end, the thesis as a whole is structured around empirical research from two major studies that have been designed to describe and analyse the evolution of corporate environmental strategy as a business phenomenon. The research is carried out through the use of a multi-study, multi-level and multi-methods research design. This particular approach was chosen mainly to take advantage of, and to draw upon, a variety of complementary characteristics of the two studies that will be described in further detail below. At the same time, though, several research challenges will have to be taken into account, and general limitations and delimitations will be explored in the discussion of the thesis in Chapter 9.

Study 1 is split into two parts and involved mixed-methods research based on primary data obtained from telephone interviews mainly with environmental managers and managing directors from a stratified sample of UK companies. The first part was conducted in form of a cross-sectional survey investigation, which was then in part two repeated almost three years later with some of the same respondents in order to obtain comparable panel data for a longitudinal analysis. This way, the longest possible period of time for a longitudinal

research project was covered given the constraints of the PhD funding. Study 1 contains Part I (Chapter 5) and II (Chapter 8) and generally had the following three aims:

- To study the state of environmental strategy among British companies in order to gain a first insight into the status quo of their environmental management plans and processes. In so doing, Part I provides the background setting and starting point for the subsequent longitudinal analyses in this thesis (Chapter 5);
- By repeating several questions from the first round of interviews with respondents of the identical firms, Part II was designed to examine in how far this state had evolved over the period of three years (Chapter 8);
- To test in how far the conceptual framework as outlined in Chapter 3 has validity in terms of explaining the evolution of corporate environmental strategy.

Study 2, by contrast, was solely based on secondary data taken from KLD for S&P500 companies in the US. *Study* 2 thus exclusively relied on quantitative panel data for the years 1991 to 2006 and was designed to obtain a more statistical overview of the evolution of corporate environmental strategy. As such, it comprises two parts, Chapters 6 and 7, 'Much ado about nothing' and 'Oil Prices and Greening'. This study too had three aims:

- To examine and quantitatively describe whether, to what extent and how large US firms have changed (or not) their corporate environmental strategies over time (Chapter 6);
- By using regression analysis to test whether a set of field-level macro-economic and firm-level variables serve as antecedents to such changes in corporate environmental strategy at population level (Chapter 7);
- To test in how far the conceptual framework as outlined in Chapter 3 has validity in terms of explaining and predicting the evolution of corporate environmental strategy.

The complementary benefits, as indicated above, arise from the following set of characteristics of the research design. First, the research combines both cross-sectional and longitudinal research strategies by taking not only snapshots of the state of corporate environmental strategy, but also by covering much longer time spans under observation of both three and fifteen years. This allowed the testing of both static and dynamic effects as required for studies with evolutionary character (refer to Chapters 2 and 3, Literature Review and Conceptual Framework, respectively). Second, the thesis draws upon both primary and secondary data in order to obtain a richer picture of the existence and the evolution of corporate environmental strategy. Both types of data have their respective

advantages and disadvantages (see Figure 12, below), and the research, therefore, aimed at counterbalancing any potential biases that might result from examining one type of data only. Of key importance for this research, however, was the ability to explore secondary data of much longer time frames than would have been possible, if I had had to rely on primary data only.

Figure 12: Advantages and disadvantages of analysing primary and secondary data

Primary data	Secondary data
▪ Influence over survey instruments and data collection process ▪ Standardised data that is easier to process ▪ Reduced errors ▪ Flexibility ▪ Time-consuming ▪ Obtrusive measure ▪ Quality dependent on response rate and responses	▪ Cost and time ▪ Opportunities for longitudinal research ▪ Unobtrusive measure ▪ Good sample size ▪ Possibility of re-analysis and triangulation ▪ Unfamiliarity with the data collection process. ▪ No control over quality, but can come from expert sources ▪ Absence of key variables, may need to recode ▪ Dataset can be large and complicated

NB: Adapted from Bryman and Bell (2003)

Third, the thesis employs a mixed methods research approach, first as an integral part of the research design of Study 1, and more generally, within the overall thesis by juxtaposing Studies 1 and 2. This choice of applying a mixed methods approach again reflects the desire to counteract the inherent biases and risks with respect to conducting empirical research based on one method only (see Figure 13, below).

Figure 13: Advantages and disadvantages of employing qualitative and quantitative research methods

Qualitative methods	Quantitative methods
▪ Richer, more detailed data ▪ Less biased in the context of ethical questions (avoid social desirability bias) ▪ Inductive orientation ▪ Depth rather than breadth ▪ Emphasis on words, text and speech ▪ Flexibility ▪ Participants' view ▪ Proximity ▪ Lack of rapport with respondents may influence data collection ▪ By using mixed methods, greater chance to avoid common methods bias	▪ Rigorous testing of hypotheses ▪ Notion of statistical significance ▪ Comparability ▪ Ease of computation and testing ▪ Deductive orientation ▪ Breadth rather than depth ▪ Emphasis on numbers ▪ Distance ▪ Researcher's view ▪ Structure & reliability ▪ Artificial and spurious sense of precision and accuracy ▪ Fails to differentiate between natural and social world, acontextual character ▪ Creates a static view of social life that is independent of people's lives ▪ Affirmation bias

NB: Adapted from Bryman and Bell (2003)

Fourth, the two studies focus on slightly different levels and units of analysis. While Study 1 was conducted at macro level by examining quasi-representative individuals within their respective organisations, the level of analysis in Study 2 is shifted toward the higher field level of an entire stock index where organisational data is supplied by a secondary data provider unrelated to this research. This mix of levels was important given the need to investigate the interaction and emergence of evolutionary phenomena from a complex adaptive systems perspective.

To a lesser extent, the thesis also affords a comparison of practices between UK and US companies. While the sample units are less comparable in terms of firm size and partly industry sectors, the research allows a certain degree of evaluation in how far the state and the evolution of corporate environmental strategy differ between UK and US firms. Lastly, by aligning the parts of Studies 1 and 2, inadvertently, the research design allows some form of continuous charting of trends of corporate environmental strategy between 1991 and 2008. Table 14, below, summarises the overall research design and compares how the two different studies address complementary research aspects.

Figure 14: Summary table of the research design

Study 1 (Chapters 5 and 6)	Study 2 (Chapters 6 and 7)
▪ Qualitative methods ▪ Quantitative methods	▪ Quantitative methods
▪ Primary data	▪ Secondary data
▪ UK	▪ US
▪ Broad sample, cross-industry sectors ▪ Large, middle and small sized firms	▪ Broad sample, cross-industry sectors ▪ Large firms
▪ Organisation level ▪ Individual level	▪ Organisation level ▪ Population level
▪ 2006 – 2008	▪ 1991 – 2006
▪ State and evolution	▪ Evolution

The overall research design is therefore best suited for exploring evolutionary processes at firm and population levels of analysis. This multi-level longitudinal analysis allows the comprehensive studying of the state and the evolution of corporate environmental strategy and automatically also achieves a certain degree of triangulation. In the following sections,

I discuss the sampling strategies and broader analytical methods of the two different studies.

4.3 STUDY 1

This first study examines how environmental issues and impacts are managed within a sample of over 100 UK companies drawn from six industry sectors. Specifically, the research explores the opinions and perceptions of some of the key managers involved in firms' environmental management in an attempt to generate a deeper understanding of both operational and strategic corporate responses to environmental issues in the UK through the use of a semi-structured telephone interview methodology using both open and closed-ended questions. Furthermore, the research studies such opinions and perceptions applying both a cross-sectional (Chapter 5) and a longitudinal (Chapter 8) research strategy. Chapters 5 and 8 from Study 1 are separated from another in this thesis with the results of Study 2 placed in between, purely with the aim to provide some form of chronological order of the results. While Chapter 5 presents a cross-sectional insight into corporate environmental strategy in the year 2006, Chapters 6, 7 and 8 cover the time period 1991 to 2008 without a gap. As will become clearer towards the end of the thesis, this chronological sequence of the empirical research plays an important part in the analysis and interpretation of the findings and thus allows a more meaningful discussion.

4.3.1 PART I (CHAPTER 5)

Empirical work concerning firm environmental management lies within the wider domain of studies addressing business and society relations and has tended to be dominated by quantitative methodologies and by a focus on the largest business organizations (Crane, 1999; Lockett *et al.*, 2006; Welford, 1998). Both Lockett *et al.*'s (2006) survey of the CSR literature and Randall and Gibson's (1990) survey of the ethical decision making literature suggest that around 80% of the empirical work in the business and society domain is quantitative in nature, raising several important methodological concerns. Three particular issues arise that are pertinent to this first study. The first problem encountered when exploring issues of social sensitivity using quantitative methods is the problem of social desirability biases that lead respondents to accentuate positive aspects of their behaviour and mitigate negative aspects of their behaviour (Chung and Monroe, 2003; Crane, 1999). Hence, there may be a tendency within quantitative studies for respondents to paint a more positive picture of their organization's performance than may be true. A second problem concerns the tendency of quantitative studies to use closed-ended questions that are

invariant to the particular contexts within which businesses find themselves (Crane, 1999; Miles and Huberman, 1994). This can lend quantitative studies an abstract or acontextual character that is divorced from the heterogeneous realities faced by businesses. A third, more practical, methodological concern with the quantitative approach, particularly as witnessed in the postal survey, is the difficulty experienced in identifying suitable respondents and in ensuring appropriate responses (Crane, 1999; Drumwright, 1994).

This study, therefore, provides both qualitative data, which allows painting a multifaceted picture of environmental management in the UK, and quantitative data, which facilitates the generation of findings that are more generalisable. Moreover, this new evidence, coupled with the findings of earlier studies, affords an insight into the evolving pattern of the management of environmental issues in British industry over the last decade. Given the introduction of significant new legislation and the growing competitive significance of environmental impacts and resource efficiency, this research is timely and provides the basis for significant business and public policy conclusions.

Sample. In order to explore both differences between larger and smaller companies and industry variations, the research design for this study necessitated the sampling of firms of a variety of sizes and across a range of economic sectors that were exposed to different environmental issues. Given these needs, a stratified random sampling approach was adopted where the sampling frame is divided into non-overlapping groups and a random sample of companies is taken from each group (Lohr, 1999). Stratified sampling has the advantage of reflecting the full range of the diversity of companies along the dimensions of stratification and often produces samples that are more representative of the general population than a simple random survey (Lohr, 1999). The focus was set on six sectors: food/drink, electronics, engineering, retailing, transport, and chemicals. These industries are exposed to many of the most pressing environmental challenges and provide a mix of service and manufacturing activities.

For the sampling frame a database of the population of UK public and private limited companies was used, which I obtained from Bureau van Dijk's *Fame*. In order to find suitable respondents, companies were first approached by 'mass-email' or via 'cold calling'. 6,238 emails were sent out in the process. Where a willing respondent was identified, an appointment was made for a subsequent telephone interview to take place. Despite 107 companies declining to participate in the survey for various reasons, the first

round of research produced 166 complete interviews over a period of three months (January to March 2006).

Figure 15, below, affords an overview of the different job titles the respondents held. The job titles of the respondents reflected the size of firms, for instance, titles within large firms often referred to corporate or group managers such as Group or National EHQS Manager or Corporate Environmental/CSR Director, whereas, especially for the small firms, I often spoke directly to the Managing Directors. Respondents of medium-sized firms frequently came from an operations-based or technical background. Respondent patterns for the different industry sectors were difficult to determine, although engineering firms were relatively often represented by environmental managers.

Figure 15: Respondents' job titles and responsibilities (Part I – Chapter 5)

Number of respondents	Job Title/Responsibility
44	Quality, Environment, Health & Safety Manager
36	Operations Director/Manager
35	Environmental or Sustainability Director/Manager
17	Managing Director/CEO
10	Commercial Director/Manager
6	Corporate Social Responsibility Manager
7	Plant/Facilities Manager
5	Engineer
3	Chairperson
3	Administrative Staff or Company Secretary
166	Total

Figure 16, below, provides an overview of the sample with Panel A showing some sample means for several indicative financial variables of the sample companies. The average sample company had annual sales of around £0.5bn, with a similar level of total assets, employed around 4,700 people, made a gross profit of around 8.5% of sales and obtained around 7% of sales from the public sector. However, these means mask considerable sample diversity. For example, the size of sample companies, measured by annual turnover and the number of employees, ranged in size from companies employing 3 people with annual sales in the region of £70,000 to global giants employing over 50,000 people and having annual sales of over £10bn. Panel B of Figure 16 shows that, overall, the sample

was roughly evenly split between large companies (those employing more than 250 people) and small and medium sized companies (those employing fewer than 250), with 98 large (59%) and 69 (41%) smaller companies in the final sample. Concerning the industrial composition of the sample, Panel C of Figure 16 suggests that the stratified sampling approach successfully provided a good spread across sectors with the number of responses ranging from 23 (transport) to 33 (chemicals).

Figure 16: Sample characteristics (Part I – Chapter 5)

Part A: Means for financial values

Turnover (£'000)	532,425
No. of employees	4,312
Total assets (£'000)	484,742
% Turnover from public procurement	6.78%
Return on sales	8.66%

Part B: Sample breakdown by firm size

	Number of responses	% of sample
Large (>250 employees)	98	58.7
Medium (50-249 employees)	46	27.5
Small firms (>50 employees)	23	13.8
All firms	167	100.0

Part C: Sample breakdown by industry sector

	Number of responses	% of sample
Engineering	29	17.5
Chemicals	33	19.9
Retail	27	16.3
Transport	23	13.9
Electrical	26	15.7
Food	28	16.9
All firms	166*	100.0

*One firm could not be classified to any industry group.

Research approach. The research was carried out using telephone interviews. Telephone interviewing enables data to be collected from geographically scattered samples more cheaply and quickly than by face-to-face interviewing. In addition, because telephone interviews are administered, this method helps to avoid some of the limitations of postal surveys (Lavrakas, 1993). In particular, telephone surveying tends to lead to a rise in response rates and a reduction in the incidence of incompleteness, misunderstanding, and inappropriateness in responses when compared to postal surveys (Lavrakas, 1993).

Telephone interviews also strike a good balance between closeness and distance since they are not as obtrusive (and thus potentially influential) as face-to-face interviews, yet they also facilitate a closer relationship between interviewer and respondent in comparison to online or mail surveys. However, disadvantages include not being able to engage in the observation of respondents to overcome problems with understanding the questions, concerns with ascertaining it is really the desired person that is replying on the telephone, and the fact that one cannot employ visual aids (show cards) (Bryman and Bell, 2003). In order to elicit responses that genuinely reflected the respondents' views, I assured each respondent that their identity and that of their organisation would be kept anonymous. Similarly, I conducted all of the telephone interviews myself in order to ensure consistency in the interviewing approach. On average, interviews lasted 35 minutes and ranged from 20 minutes to 1hr 20 minutes. Respondents were asked if they were willing for interviews to be recorded so that complete records of the telephone interview could be obtained and in order to relieve the interviewer of the responsibility of taking notes during the interview. All respondents agreed to this proposed procedure. Transcribers then transcribed interview tapes verbatim and the resulting transcripts were analysed.

The research was pursued through open-ended questions that were, in several areas, supplemented by simple multiple-choice options. Consistent with the aim and the conceptual development of the thesis, the survey was structured so as to investigate firms' current operational behaviour and legislative responsiveness as well as to elucidate companies' strategic foresight with respect to environmental matters. Effectively, the intention was to paint a more holistic picture of firms' operational and strategic behaviour as part of their environmental responsiveness. To that end, multiple-choice options were designed to gain an understanding of the existence of particular management schemes such as environmental management systems. Open-ended questions are questions without fixed limits, they permit respondents to choose freely how to answer, and are intended to encourage continued discussion in order to provide a richer source of information than closed-ended questions (Patten, 2002). Respondents were asked to illustrate their comments with examples drawn from recent experience. As Liedtka (1992) and Brand and Slater (2003) argue, respondent recall of representative examples enhances the research and improves the reliability and validity of interviewee responses. The questions were framed as neutrally as possible, avoiding wording that might influence responses wherever possible. This approach allows respondents to discuss issues in their own terms and helps avoid affirmation biases often associated with closed-ended questioning strategies (Patten, 2002). In order to facilitate comparison across respondents, I adopted a standardised

interview approach where each respondent was asked the same open-ended questions. The questions themselves were kept rather broad as appropriate for such a wide-ranging sample. The intention was to gather managerial opinions and perspectives from a very varied sample of companies and in order to allow respondents to use the interview as an opportunity to discuss their perceptions of environmental management in their respective companies I actively tried not to constrain their flow of speech. The standardized questions were developed and then piloted in five companies in order to check for issues of timing and question clarity.

The research was supplemented by Likert-scales, which were designed to measure the importance of various stakeholder pressures on companies and managers' perceptions of the most significant barriers that would hinder them to manage environmental issues more effectively. Quantitative responses were analysed using statistical packages. However, it was also necessary to process the large amount of qualitative data obtained in interviews in order to identify key themes. In order to impose a coherent structure on the analysis of this data, I first organised the data into the constituent questions and then employed a form of conceptual content analysis of the interview transcripts whereby the existence and/or incidence of particular predetermined concepts is recorded and analysed (Krippendorf, 1980; Carley, 1990). The first step in such an analysis is the definition of a set of relevant indicators, phrases, or terms that relate to the underlying phenomenon being studied. Of particular importance in this context were statements made about important challenges (for example, waste, energy, climate change), and comments concerning benefits encountered when managing environmental issues (for example, cost savings, image, risk management). The process of assigning particular respondent comments into categories required a detailed reading of a significant sub-sample of the data and, since such processes are highly subjective, the interviews were repeatedly read and coded. This process then allowed the systematic analysis of the themes present within the 166 interviews and to comment coherently on the incidence of particular opinions expressed by respondents. A copy of the survey questions can be found in Appendix A.

Research ethics. Research ethics plays an important role in social research, particularly in survey studies. All respondents were made aware of the purpose of the data collection prior to participation by informing them about the purpose, the institutions and the people involved in its process as part of the soliciting emails. Furthermore, it was entirely the respondents' choice to participate, and they had the right to withdraw from this study at any point in time without having to give reason. The interviewer also explicitly requested

to be allowed to record data at the beginning of each interview, and all respondents had the right to object to this procedure, though none did. Finally, all results were made available to the respondents following completion of the research, and all reports and publications were rendered anonymous, in other words, neither company nor individual names appeared in those publications.

4.3.2 PART II (CHAPTER 8)

Sample. In order to obtain a longitudinal panel study, the respondents from the first round of interviews were contacted again in December 2008, both by email and by telephone, to enquire whether they were interested and willing to participate in a follow-up study designed to observe any potential changes in environmental management within their firms. As could be expected from a longitudinal survey, several of the original respondents could not be contacted again because they had left the company, they had taken annual leave or a new job role, they declined to participate again, or the company could not be contacted at all. Wherever possible, I tried to establish new contacts within these firms and was subsequently referred to a total of 12 alternative respondents (22%). Out of the 166 original firms, I managed to interview individuals in 55 companies again giving a new response rate of 33% for the second wave of interviews, or an attrition rate of 67%.

Figure 17, below, provides an overview of the sample companies with Panel A showing some sample means for several indicative financial variables. The average sample company had annual sales of around £0.8bn, with a similar level of total assets and employed around 7,500 people. These figures suggest that respondent firms in this second wave of follow-up interviews were slightly bigger in size compared to those from 2006. However, these means mask again considerable sample diversity. For example, the size of sample companies, measured by annual turnover and the number of employees, ranged in size from companies employing 46 people with annual sales in the region of £8m to global giants employing over 65,000 people and having annual sales of over £10bn. Panel B of Figure 17 shows that, overall, the sample consisted mostly of large companies (those employing more than 250 people) followed by medium and small sized companies (those employing fewer than 250). Concerning the industrial composition of the sample, Panel C of Figure 17 suggests that the stratified sampling approach again successfully provided a good spread across sectors with the number of responses ranging from 7 (transport) to 11 (retail).

Figure 17: Sample characteristics (Part II – Chapter 8)

Part A: Means for financial values

Turnover (£'000)	819,109
No. of employees	7,557
Total assets (£'000)	639,199

Part B: Sample breakdown by firm size

	Number of responses	% of sample
Large (>250 employees)	39	70.9
Medium (50-249 employees)	10	18.2
Small firms (>50 employees)	6	10.9
All firms	55	100

Part C: Sample breakdown by industry sector

	Number of responses	% of sample
Engineering	10	18.2
Chemicals	9	16.4
Retail	11	20.0
Transport	7	12.7
Electrical	10	18.2
Food	8	15.6
All firms	55	100*

*Figures do not add up to 100 due to rounding effects.

Figure 18, below, affords an overview of the job titles and responsibilities held by the survey respondents of the second round of interviews. An initial, more general, observation with respect to respondents' job titles was that they have, in many instances, been adjusted over the course of the three years to reflect the inclusion of managerial responsibility for environmental issues and sustainability. For example, while one respondent's title used to be the 'Operations & Supply Assistant', in 2008 her title now additionally included 'Environmental Co-ordinator'. And while another had previously been simply 'Operations & Utilities Director' in 2008, he had been promoted to 'Operations, Utilities & Sustainability Director'. A further development was that several job titles in 2008 had been upgraded to reflect heightened corporate importance rather than a pure advisory function. For example, a former 'Environmental Advisor' became 'Environmental Manager', or an 'Environmental Manager' became 'Head of Quality and Sustainability'. These simple developments at least superficially suggest a generally more progressive evolution towards greater environmental awareness and significance as part of firms' environmental strategies.

Figure 18: Respondents' job titles and responsibilities (Part II – Chapter 8)

Number of respondents	Job Title/Responsibility
15	Quality, Environment, Health & Safety Manager
12	Environmental or Sustainability Director/Manager
9	Corporate Social Responsibility Director/Manager
5	Operations Director/Manager
5	Managing Director/CEO
3	Commercial Director/Manager
2	Engineer
2	Chairperson
1	Plant/Facilities Manager
1	Administrative Staff or Company Secretary
55	Total

Research approach. As in 2006, the research was carried out through telephone interviews. Each respondent was again assured that their identity and that of their organisation would be kept anonymous. In order to ensure consistency in the interviewing approach, again only I conducted all of the telephone interviews. On average, interviews lasted 19 minutes and ranged from 7 minutes to 51 minutes in length. Respondents were asked if they were willing for interviews to be recorded so that complete records of the telephone interview could be obtained and in order to relieve the interviewer of the responsibility of taking notes during the interview. All respondents agreed to this proposed procedure. Transcribers then transcribed interview tapes verbatim and the resulting transcripts were analysed in conjunction with the hand-written notes made by the interviewer.

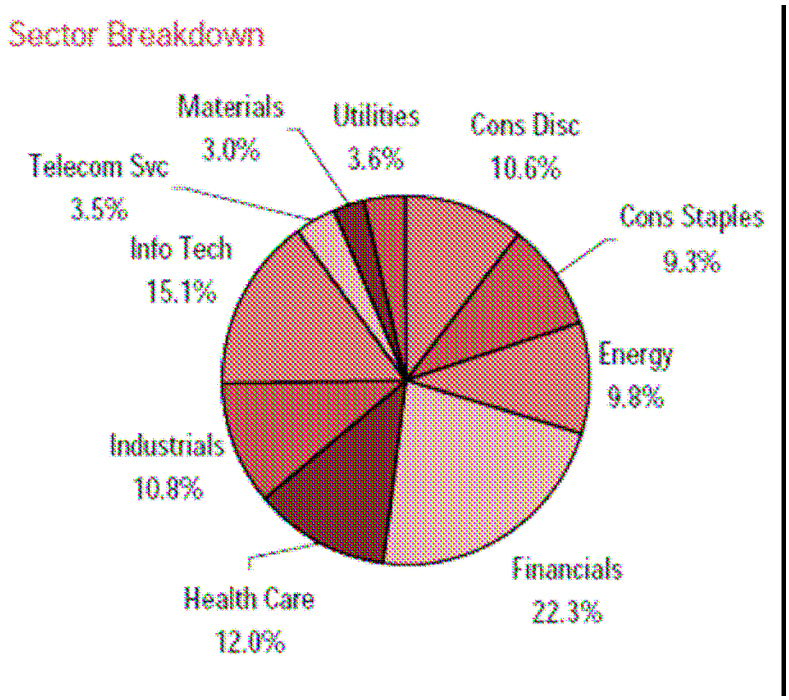
The survey was pursued through some of the same questions from 2006 as well as new open-ended questions, which were, in one case, supplemented by a simple multiple-choice option. This option was designed to gain an understanding of the existence of a particular environmental management system. The survey was also supplemented by the identical Likert-scales used in 2006, which were designed to measure the importance of various stakeholder pressures on companies as well as managers' perceptions of the most significant barriers that would hinder them to manage environmental issues more effectively. Quantitative responses were then analysed using statistical packages, whereas

qualitative data were explored employing the same methods as in Part I. A copy of the survey questions can be found in Appendix B.

4.4 STUDY 2

Sample. In order to examine the evolution of corporate environmental strategy the second study used sample data drawn from Standard and Poor's index of the 500 biggest companies in the US for the time period 1991-2006. S&P500 features heavily in the finance and economics literature but scholars have studied S&P500 samples also in the context of CSR, because it 'increases the likelihood that public data are accessible' (Shropshire and Hillman, 2007: 74). The S&P500 includes the leading industries of the US economy and although it focuses on the large cap segment of the market, with approximately 75% coverage of US equities, it is also an ideal proxy for the total market (S&P Factsheet, 2007). At the end of 2006 the S&P500 industry distribution was as shown in Figure 19, below. It includes a wide range of industry sectors with a slight bias towards the finance sector and therefore serves as a good representation of the US economy as a whole.

Figure 19: S&P500 sector breakdown as of 31.12.2006 (Source: S&P500 factsheet)



4.4.1 PART I (CHAPTER 6)

The first part of this study explored a slightly shorter time frame than was available since preliminary analyses indicated that data of the early years of the overall sample frame

contained comparatively little variation and therefore did not allow meaningful data exploration. Thus, the first study refers to the time frame 1997 to 2006. Over time the composition of any stock index changes as new firms grow and enter the index, firms 'de-list' or go bankrupt and as mergers and acquisitions occur. These changes reflect the evolving population of companies. In order to isolate the effect on environmental strategy of these population-level influences from the changing behaviour of individual companies, two samples were constructed for examination in the analysis:

I) A contemporaneously defined S&P500 sample – this entailed *all* firms that were included in the S&P 500 in any given year;
II) A balanced panel of companies – here firms were only included if they were consistently present in the S&P500 for every year between 1997 and 2006.

While the latter sample allowed controlling for the changing composition (particularly in terms of industry) of the data, at the same time, however, it had the disadvantage of introducing a 'survivorship bias' in the sense that the firms under scrutiny resemble the more long-lived and, on average, more successful companies. The limitations arising from this selection are discussed in Chapter 6. Figures 20 and 21 afford an overview of some statistics of the two samples.

Figure 20: Descriptive sample statistics

Sample	Number of Firm-Year Observations	Number of Companies	Notes
I	4775	738	Sample firms vary across the time period of observation
II	2260	226	Sample firms are consistently present from 1997-2006

Figure 21: Industry sector composition of the balanced sample (II) for 1997-2006 (N=226)

Mining 7 (3%)	**Construction** 2 (1%)	**Food** 12 (5%)	**Tobacco** 2 (1%)	**Textiles** 2 (1%)	**Wood & Furniture** 2 (1%)
Paper & Printing 10 (4%)	**Chemicals** 26 (12%)	**Petrol** 3 (1%)	**Rubber** 2 (1%)	**Leather** 1 (0%)	**Stone** 0 (0%)
Metal (Primary) 4 (2%)	**Metal Processing** 5 (2%)	**Machinery** 14 (6%)	**Electrical** 12 (5%)	**Transport Equipment** 10 (4%)	**Instruments** 17 (8%)
Miscellaneous Manufacture 2 (1%)	**Transport** 4 (2%)	**Utilities** 18 (8%)	**Retail & Wholesale** 20 (9%)	**Finance** 34 (15%)	**Services** 17 (8%)

Corporate environmental strategy. The measure of corporate environmental strategy was drawn from the Kinder, Lydenberg and Domini (KLD) database for 1997-2006. The KLD data have been extensively used in previous research (for instance, Hillman and Keim 2001; Waddock and Graves 1997; McWilliams and Siegel 2000) and are widely regarded as 'the de facto research standard at the moment' for measuring aspects of corporate social performance in scholarly research (Waddock 2003: 369). With the exception of the Toxic Release Inventory (TRI), KLD data are probably the only other fruitful source for analysing corporate environmental strategies in a longitudinal study. However, the TRI data are only available for some high-impact industry sectors. That said the appropriate use of the KLD data has been the subject of considerable methodological debate (Mattingly and Berman, 2006; Sharfman, 1996). In any given year, the KLD data consist of a set of between 65 and 80 binary variables each of which indicates the presence or absence of an area of positive or negative business impacts (respectively labelled 'strengths' and 'concerns') on stakeholders, including the natural environment.

Consistent with the conceptual approach and the definition of environmental strategy, the intention was to use the KLD data to construct a measure of corporate action with respect to environmental issues. Specifically, I was mainly interested in the ratings of *environmental strengths* and *environmental concerns*. After studying the descriptions of strengths and concerns categories, I came to the conclusion that most of the concerns categories (especially hazardous waste, ozone depleting chemicals, agricultural chemicals and climate change) do not actively reflect the efforts and results of any company's active environmental strategy, but rather describe outcomes which many companies, especially in the 'dirtier' engineering, manufacturing and (petro-) chemical industry sectors, have automatically only relatively little influence on themselves unless they find radical alternatives or leave the industry. For example, areas of possible concerns relate directly to a firm's production of agricultural chemicals or fossil fuels. Since these are not behavioural (or are so to only a very limited extent), those items that are directly industry-based were excluded from the analysis. For instance, in some cases categories may potentially also be biased by firm size (ENV-con-C: Ozone Depleting Chemicals), or there was insufficient information available as to what the category exactly entails (ENV-con-X: Other concern). As the number of categories of strengths and concerns has also varied over time, reflecting the introduction of new issues and the deletion of old ones, I also excluded all strengths and weaknesses that were not reported throughout the sample period from the analysis. An exception to this rule was the inclusion of the criterion environmental strength G – management systems, which was introduced in 2006. Inspection of the data revealed that

this category appeared to partly replace previous counts in the strength category X – other benefits. As such it only represents data that were previously clustered together in the non-defined category.

4.4.2 PART II (CHAPTER 7)

The main difference between Parts I and II revolves around the size of the data frame and the research methods applied. While Part I explored variation in the existence of environmental strategy data between 1997 and 2006, Part II draws on a slightly extended time period of 1991 to 2006. This was done in order to maximise the full potential of the database for the subsequent data analysis. For the research I employed ordered probit regression analyses with several independent and control variables. Further details of these dependent and independent variables as well as a description of the specific research methods applied are outlined in the respective Chapters 6 and 7.

4.5 CHAPTER SUMMARY

This chapter has described and justified the general methodology used for the research in this thesis. It outlined in detail the two studies and their respective sampling and analytical approaches for the relevant parts (chapters). To summarise, this thesis relies on a multi-study, multi-methods and multi-level analysis of both primary and secondary data in order to investigate the phenomenon of the state and evolution of corporate environmental strategy. The choice of this particular research strategy has been justified on the grounds of benefiting from the complementary research characteristics employed in this study as well as the desire to best explore aspects of complexity theory without having to resort to computer simulation studies.

CHAPTER 5: THE STATE OF ENVIRONMENTAL STRATEGY IN THE UNITED KINGDOM[4]

[4] This chapter contains a synthesis of material published in the following journals:
Dahlmann, F.; Brammer, S. & Millington, A. (2008) Environmental Management in the United Kingdom: new survey evidence *Management Decision* 46(2): 264-283. [http://www.emeraldinsight.com]
Dahlmann, F; Brammer, S. & Millington, A. (2008) Barriers to proactive environmental management in the U.K.: Implications for business and public policy *Journal of General Management* 33(3): 1-20.

5.1 INTRODUCTION

This chapter provides the background and context for the subsequent longitudinal research by performing a cross-sectional assessment and characterisation of the state of environmental strategy among a stratified sample of UK companies in the year 2006. In particular, Chapter 5 seeks to answer the following questions: What are firms doing both individually and at population level in order to respond to pressures arising from concerns about environmental degradation? What is companies' general outlook on environmental management? What are firms' perceptions of and motivations with respect to environmental issues and what, if any, barriers do exist that stop them from (proactively) engaging with them? And in particular, how do corporate responses vary between different industry sectors and for different firm sizes? Therefore, this chapter's two main aims are:

- To examine the general state of corporate environmental strategy among UK companies in the year 2006;
- By comparing this study to earlier research to gain a first insight into the longitudinal trends of environmental strategy and thus lay the empirical foundations for the remainder of the thesis.

5.1.1 EXISTING RESEARCH

Looking specifically at existing evidence concerning environmental management in the UK, several studies can be identified (for instance, Ghobadian *et al.*, 1995; MORI 2005; Strachan *et al.*, 1997; Tilley, 1999). Reflecting the general pattern present in the wider CSR literature, earlier research concerning environmental management has tended with some notable exceptions to favour quantitative analysis, to adopt a survey methodology using closed-ended questions, and to focus on either the largest companies (e.g., Ghobadian *et al.*, 1995) or small companies (e.g., Clemens, 2006; FSB 2004). Ghobadian *et al.* (1995) examined environmental management practices among a sample of 78 of the 200 largest publicly listed UK companies through the use of a postal questionnaire survey methodology. Their findings suggest that 'bottom line concerns appear to be paramount' (Ghobadian *et al.*, 1995: 52) in guiding corporate environmental management, and that companies were typically 'seeking shorter term dividends from any proactive measures, rather than seeking longer-term benefits' (Ghobadian *et al.*, 1995: 56). Strachan *et al.* (1997) examined corporate motivations for environmental management system (EMS)

adoption, discovering that firms had implemented EMSs in the hope of improving public relations with stakeholders, and for commercial and legal reasons.

Furthermore, although some empirical work has addressed related issues in more specific contexts and in other countries (Baumast, 1997; Hillary, 2000; Post and Altman, 1994), this study is the first to explore company perceptions of barriers to more effective management of corporate environmental impacts in the UK context and in a large sample of organizations drawn from a varied range of industries and of varying sizes.

This chapter is structured as follows. First, it reviews relevant parts of the environmental management literature pertaining to types of strategy, motivations, processes and barriers. The findings and a concluding discussion section follow.

5.2 LITERATURE REVIEW

In order to place the empirical work into context, this section reviews five related elements of the existing literatures concerned with motivations for, and barriers to, strategic business responses to environmental issues.

5.2.1 CLASSIFICATIONS OF BUSINESS ENVIRONMENTAL STRATEGIES

A significant body of research has aimed to characterise the state of corporate environmental strategies emphasising the degree McKay (2001) and the time-sensitivity of corporate environmental responses (Henriques and Sadorsky, 1999), the motivations, and the inter-organisational character of environmental strategy. In the existing literature a number of frameworks have been developed that divide strategies into reactive compliance with environmental regulation and proactive processes that go beyond (Sharma and Vredenburg, 1998). For example, Aragón-Correa (1998) differentiates between environmental excellence, leading edge, compliance, compliance plus, and non-compliance. Some classifications examine the motivations for managing environmental issues such as sustainable development (Hart, 1997), pollution prevention (Buysse and Verbeke, 2003), environmental leadership (Buysse and Verbeke, 2003), and include Petulla's (1987) distinction between crisis-oriented, cost-oriented, and 'enlightened' environmental management. Other typologies revolve around the focus of strategic attention and differentiate between 'market strategies' and 'non-market strategies' (Maxwell *et al.*, 1997) or they apply Porter's strategic positioning model and classify environment-related investments according to their potential to become sources of

competitive advantage (Orsato, 2006). Lastly, several typologies of corporate environmental responses raise issues concerned with the extent to which strategies are partnerships between businesses, other companies, industries and wider societies (Hutchinson, 1996; Kolk and Pinske, 2004).

5.2.2 ENVIRONMENTAL MANAGEMENT PROCESSES AND SYSTEMS

Formal managerial structures and processes have long been associated with strategic decision-making in companies and viewed as indicative of the state of corporate environmental management. In particular, Buysse and Verbeke (2003) identified the following five 'resource domains' as being associated with proactive environmental management: 'Investments in conventional green competencies related to green product and manufacturing technologies; investments into employee skills; investments in organisational competencies; investments in formal (routine-based) management systems and procedures, at the input, process, and output sides; and efforts to reconfigure the strategic planning process, by explicitly considering environmental issues and allowing individual(s) responsible for environmental management to participate in corporate strategic planning' (Buysse and Verbeke, 2003: 455).

Both Berry and Rondinelli (1998) and Maxwell *et al.* (1997) stress the importance of top management leadership in the active change process towards greater environmental responsiveness and illustrate several management strategies '1) waste minimisation and prevention; 2) demand-side management; 3) design for environment; 4) product stewardship; and 5) full-cost accounting' (Berry and Rondinelli, 1998: 42). Others promote the *zero manufacturing paradigm*, 'where companies simultaneously work to achieve zero defects (quality), zero inventory (just-in-time inventory and supplier relations), and zero waste and emissions' (Biondi *et al.*, 2000: 55). Equally important is the 'recognition and adaptation of suggestions from domestic and international environmental and consumer groups' (Maxwell *et al.*, 1997: 131).

A more formal response to these organisational changes has been the introduction of environmental management systems, such as, for example, ISO 14001 and EMAS (Biondi *et al.,* 2000; Boiral, 2007; Darnall and Edwards, 2006; Florida and Davison, 2001; Schaefer, 2007). As a result of mounting government and industry pressures, companies have decided to formalise their environmental management processes, to monitor and improve their procedures, and ultimately, to become audited and certified with their

respective scheme. While many praise the schemes' analytical capabilities, Burström von Malmborg claims that they also assist firms as a 'tool for communicative action and organisational learning' (2002: 312). And although more and more firms have started spreading best practices through industry-benchmarking or government-organised knowledge sharing centres, Christmann (2000) warns that simply by mimicking what others are doing reaping great benefits may not necessarily materialise and does not lead to competitive advantage for all firms.

5.2.3 MOTIVATIONS FOR ENVIRONMENTAL RESPONSES

Broadly speaking the literature identifies three categories of drivers of a firm's environmental responsiveness, which naturally overlap and mutually affect one another: Economics-driven responses, stakeholder-driven responses, and strategy-driven responses.

The first group of responses is associated with lowering costs, achieving efficiency and competitive advantage. Most empirical studies confirm that the majority of the surveyed companies operate with primarily economic mindsets and regard environmental management policies and techniques as pure means to an end (Berry, 2004; Biondi *et al.*, 2000; Florida and Davison, 2001; Ghobadian *et al.*, 1995; O'Rourke, 2003). Often this requires consolidation with existing management schemes in functional areas such as quality, and health and safety (Morrow and Rondinelli, 2002). But increasingly firms are also responding to pressures from buyers in their industry, such as the automotive industry where certain environmental minimum standards for suppliers exist, or they have to deal with environmental resolutions from shareholders and investors (Jeucken and Bouma, 1999; O'Rourke, 2003). These operational issues are implemented in order to remain competitive, innovative and cost efficient (Biondi *et al.*, 2000) and are often rationalised through the resource-based view of the firm. Sometimes also economic incentives such as tax breaks, interest-free loans and revenue opportunities (emissions trading schemes) provide further motivation to engage in environmental management.

Stakeholder-driven motives for firm environmental management are usually framed in the socio-institutional view of the firm, which portrays the firm as a nexus of contractual and informal relationships. According to this theory a company has duties and responsibilities to groups of people beyond the legal owners of the firm, which it needs to include in its deliberations. These groups refer to stakeholders who have an interest in the processes and outcomes of the firm such as employees, suppliers, government, communities, and

pressure groups (Berry, 2004; Henriques and Sadorsky, 1996; Hillary, 2000). Therefore, dealing with stakeholders' expectations in terms of the environment becomes an extended role of the company and its employees and this is increasingly managed under the umbrella term 'corporate social responsibility', or 'stakeholder integration' (Sharma and Vredenburg, 1998). Hillman and Keim argued that 'investing in relationships with primary stakeholders can lead to valuable, socially complex resources and intangible competencies that are important in gaining and maintaining competitive advantage' (2001: 128). Especially dealing with the ever-increasing regulation on national and international basis is becoming one of the biggest driving forces for companies' environmental responsiveness (Berry, 2004; Berry and Rondinelli, 1998; Biondi *et al.*, 2000; Florida and Davison, 2001; Ghobadian *et al.*, 1995; Henriques and Sadorsky, 1996; Kolk and Levy, 2001; Morrow and Rondinelli, 2002). Khanna and Anton reported that 'improving compliance with regulations was not as much an incentive for firms to adopt EMSs but rather to reduce the threat of liabilities and costs of compliance with those regulations' (2002: 552).

The last group of drivers for firm environmental management entails a more proactive and enlightened approach. As mentioned earlier in the classifications of environmental strategies, for some firms dealing with the environment requires more than accommodating, reactive responses to legislation and external pressures. Instead, proactive firms integrate environmental issues as crucial drivers for their strategic positioning and operation. Although strategy-driven responses are ultimately a more sophisticated form of economics- and stakeholder-driven responses, some company executives also emphasise personal values and a moral belief to protect the environment and to act in as environmentally friendly ways as possible as part of their duties (Bansal, 2003; Bansal and Roth, 2000; González-Benito and González-Benito, 2005). Such statements, however, need to be treated with suitable caveats about rhetoric versus reality and the challenge of disentangling them (Crane, 1999; Ruspini, 2002). More economically speaking, both Berry and Rondinelli (1998) and Ghobadian *et al.* (1995) argue that firms that are responsive to environmental issues beyond short-term cost reducing issues may be able to gain competitive advantages and commercial opportunities, which the reactive forms of responses would fail to capitalise on.

Despite this significant body of extant research promoting the development of proactive environmental strategies (Christmann, 2000; Clemens, 2006; Porter and van der Linde, 1995), a range of other factors can be identified that may potentially play an important role

in obstructing improvements in corporate environmental performance. In particular, two bodies of research are discussed. The first body directly focuses on barriers to environmental improvements in various contexts (Baumast, 1997; Hillary, 2000; Post and Altman, 1994). The second body of research identifies necessary and enabling conditions for high-level environmental performance, since the absence of necessary, or even important, conditions may also block improved environmental performance (Hart, 1995; Russo and Fouts, 1997).

As part of this extant literature, two studies have developed typologies of barriers to improved corporate environmental performance. Post and Altman (1994) identify two types of obstacles, industry and organisation barriers. Industry barriers include technical information, capital costs, the configuration of current operations, and competitive pressures and industry regulations, while organizational barriers include factors such as employee attitudes, poor communications, past practice, and inadequate top management leadership (Post and Altman, 1994). In a similar fashion, Baumast's (1997) classification of obstacles to improved environmental performance distinguishes between internal (financial and other resource constraints as well as managerial and employee attitudes) and external barriers (legislative and regulatory difficulties, and the absence of green market opportunities and technical solutions). While recognising the considerable degree of interdependence between internal and external barriers to more effective management of environmental issues, the remainder of this section retains this basic distinction. I begin by focusing on internal barriers before turning to external barriers.

5.2.4 INTERNAL BARRIERS

In discussing barriers to corporate greening, a primary distinction is often drawn between large organizations and small and medium sized enterprises (SMEs) (Aragón-Correa *et al.*, 2004; Christmann, 2000; Clemens, 2006; Hart, 1995; Russo and Fouts, 1997; Sharma and Vredenburg, 1998). The significance of this distinction lies in a number of inherent company characteristics, such as the availability of firm resources, levels of industry competition, extent of media scrutiny, and customer and supplier bargaining power that are often hypothesised to facilitate, enable and encourage corporate environmental responses (Gadenne *et al.*, 2009; Jenkins, 2004; Tilley, 1999). Small and medium sized firms typically find it much harder to engage in proactive environmental management for reasons beyond their range of influence and as a direct result of their size (Dilts and Prough, 1989; Leathers, 1972), or at least they face different barriers and obstacles compared to large

corporations. Some empirical evidence by Biondi *et al.* (2000) found that in the context of implementing environmental management systems, SMEs were not struggling with the direct financial costs, but more importantly with the indirect costs arising from a lack of management time available for EMS implementation as well as shortages of staff and technical resources. Similarly, Hillary (2000) recorded differences in target audiences for Eco-Management and Audit Scheme (EMAS) certification between small firms and medium sized companies, while Revell and Blackburn (2006) found that small owner-manager firms in the construction and restaurant industries experienced great challenges with environmental legislation since they have little time or financial incentives to engage in sustainability.

Corporate greening may also involve internal resources and capabilities which many firms lack, and their absence may be limiting improvements in environmental performance (Hart, 1995; Russo and Fouts, 1997). Taking the resource-based view of the firm, Hart (1995) proposes that in order for companies to effectively engage in proactive environmental strategies, firms need at least a minimum set of internal environmental skills and managerial support. This argument partly relates back to the large corporation versus SME distinction mentioned earlier, but could also apply more generally because all firms place different emphasis on human resource requirements and top management support. Environmental product innovation and strategies almost always draw upon employee-involvement, cross-disciplinary coordination and integration as well as a propensity for learning, trial and error, training and continuous development (Hart, 1995; von Malmborg, 2002). These complex processes require skills, which exceed routine-based, production line oriented work and which are therefore scarce in their existence and at the same time more costly (Shrivastava, 1995b). While such skills and top management support can have unexpected benefits in terms of firm image, recruitment, and productivity gains, many companies appear to divert their attention to other issues or simply neglect them. Research among UK companies registered under the EMAS revealed that firms sought to improve their public relations with stakeholders as well as applying for EMAS for commercial and legal reasons (Strachan *et al.*, 1997). However, many organisations struggled with a lack of technical skills and the training requirements of key personnel. Hillary (1998) demonstrated that a lack of in-house company expertise with environmental management posed a huge obstacle to EMAS implementation. She also summarised internal and external barriers for SMEs adopting EMSs, listing resources, understanding and perception, implementation, and attitudes and company cultures as internal barriers

(Hillary, 2000: 21). In the same vein, further research into internal problems with EMS implementation include Tinsley's (2002: 377-380) organisational barriers, and Kirkland and Thompson's (1999) findings of failure to delegate responsibility without resources or power to implement change; lack of skills, knowledge and expertise; and problems with resources (money and time). Additionally, Shelton (1994) and Shelton and Shopley (1996) highlighted the fact that, despite having initially made great progress in their environmental management, many firms were hitting a 'green wall'. They attributed this to environmental managers often not speaking the same business language as everyone else and to a general lack of strategic integration of the environmental management function into established business routines and processes.

5.2.5 EXTERNAL BARRIERS

Legislative and regulatory factors may also present a significant barrier to corporate greening (Berry and Rondinelli, 1998; Porter and van der Linde, 1995). There are two strands to this argument, which commonly fall into the categories of 'push and pull factors'. The first strand emphasises the complexity that arises in contexts characterised by multiple levels of bureaucracy and varying degrees of power by legislative authorities. Where multiple agencies are involved in determining, legislating, and enforcing environmental policy, there is the capacity for inconsistencies in application and interpretation to arise between these levels of policy making and implementation. With respect to environmental policy in the UK, multiple policy makers and agents exist, such as the EU, the UK government, Envirowise, the Department for Environment, Food and Rural Affairs (DEFRA), the Department for Trade and Industry (DTI), as well as regional organisations (the Scottish Environment Protection Agency, SEPA and the Welsh 'Green Dragon'). This complexity could result in mismanagement of legislative drafting and implementation, uncertainties to business planning, and ultimately to confusion and reluctance of corporate management.

A second strand of argument concerns the need for approaches to environmental legislation to embody sufficiently clear economic incentives to stimulate appropriate and efficient corporate responses. Porter and van der Linde (1995) argued that stringent environmental standards and regulations should actually be perceived by companies as triggers for innovations that encourage reductions in inefficient resource deployments and waste streams through the development of new products and processes. Consistent with this,

Berry and Rondinelli recommended that governments reward over-complying firms through the use of 'more flexible compliance options, emission or effluent charges, product changes, enforcement incentives, emissions trading, environmental performance bonds, and deposit-refund systems' (1998: 48). This would send the right signals to companies that environmentally proactive firms were reaping the benefits whereas polluters had to pay. Empirically, Clemens (2006) found that there was a positive relationship between green economic incentives and firm performance, concluding that firms should demand greater green economic incentives from governments. Hence, the absence of perceived economic incentives to reduce environmental impacts is likely to retard firms' willingness to invest in environmental improvements.

Equally, the presence of environmentally interested customers can provide a significant impetus to corporate greening, whereas the absence of such an incentive can impede corporate greening. Environmental consumerism and green marketing strategies have been widely discussed in the literature (e.g., Crane, 2000a; Peattie, 1992) with existing contributions illustrating how environmental impacts may play an important role in shaping the decisions of both business and final consumers. Green *et al.* (1998) and Prothero (1990) suggest that customer pressures would eventually be passed through supply chains and would then end up in firms' R&D departments where they would need to be translated into innovations. But also 'links to research in universities and elsewhere, the influence of government-imposed regulation and of government subsidy for research into and use of new technologies' were all identified as important for firms' innovative behaviour (Green *et al.*, 1998: 93). Orsato (2006: 140) classified four environmental differentiation strategies and stressed that firms in pursuit of competitive advantage have to fundamentally ask the key question of 'who is valuing my environmental investments?' Other studies identified customers as one of the main drivers for firms to adopt a formal EMS (Hillary, 2000). Khanna and Anton (2002) observed that firms in close consumer contact and those selling final goods were more likely to implement comprehensive and higher quality EMS than those in intermediate industries. In spite of this evidence, Crane (2000a) warned against the 'backlash of consumers against green marketing strategies' based on 'under-performing green products, overzealous promotional claims, inexact science and inconsistent legislation conspired to discredit the practice of green marketing' (Crane, 2000a: 278). Paying special attention to environmental marketing strategies, several different barriers have been noted as inherent characteristics of green products, e.g. higher product cost, little choice, aesthetic disadvantages, or complexity of information

(Coddington, 1993; Peattie, 1992). Another important aspect and potential drawback of green products was how to demonstrate the products' environmental superiority to consumers (Carlson *et al.*, 1996; Peattie, 1992; Polonsky, 1995). Consequently, selling products purely on the merits of their latent environmental benefits has proven to be one of the biggest obstacles for firms' market success (Peattie, 1992; Polonsky, 1995). Empirical evidence suggests that with the exception of a few industries, the market share of green products has not changed significantly over the past decade (Wong *et al.*, 1996) suggesting a lack of consumer-pull for corporate greening in many markets.

Given this state of the literature, the aim of this chapter is to study in the existence and significance of motivations, processes, and internal and external barriers as well enabling conditions on the state of environmental management in British industry. Specifically, a key question in this regard is in how far have firm size and industry sector an effect on managerial perceptions of motivations and barriers. In other words, are there differences between firms of different sizes within different industries and the way in which they are able or hindered to execute (proactive) environmental management? Finally, the overarching purpose of this study is to arrive at a preliminary assessment of whether interpreting the state of corporate environmental strategy through the lens of the conceptual framework as presented in Chapter 3 also helps with predicting and explaining longitudinal changes in this regard.

5.3 FINDINGS

This section presents new survey evidence regarding the state and nature of environmental management activities in British industry. In order to paint as rich a picture of current environmental practice in the United Kingdom as the data will allow, the questions are addressed using both quantitative and qualitative evidence. Before discussing the detailed findings, it is worth stressing that generally speaking the sample companies are taking actions to improve their environmental impacts. It is greatly encouraging to observe that the vast majority of respondents are engaging in activities ranging from relatively commonplace actions, such as recycling paper or introducing low-energy lighting to more strategic and complex process innovations requiring significant capital investment.

5.3.1 MAIN ENVIRONMENTAL CHALLENGES

A primary insight into business perceptions of environmental issues can be gained by exploring which environmental issues are seen by respondents as presenting the main current challenges to their organisations. Therefore, as a first step in discussing business responses to environmental issues, respondents were asked the following open-ended question: what are the main environmental challenges facing your organization? These findings are reported in Figure 22, below. The pattern of responses highlights that while sample companies are encountering a very diverse range of environmental challenges, some issues do appear to have a high level of salience for large groups of companies. Among these, the issues of energy use and waste management are the most common, cited by 57% and 58% of companies respectively, with other issues, such as pollution, water, and recycling being encountered by a smaller proportion of companies. Within this general pattern, it is notable that climate change, an issue with a great deal of current salience among the general public and in policy circles attracts only a very low level of significance among the business community.

Panels A and B of Figure 22 provide an insight into the degree to which particular challenges vary with firm size and industry sector. Following the DTI's classification, the sample was split into large companies (those firms employing more than 250 employees), medium sized companies (those employing between 50 and 250 employees), and small sized companies (those employing fewer than 50 employees). Generally, the ranking of the importance of environmental challenges appears to be similar for firms of different sizes, though the evidence does suggest that larger firms report that they are facing a larger number of environmental challenges than smaller firms. This might reflect the greater exposure of large companies to many legislative initiatives. Panel B of Figure 22 reveals considerable variation in the salience of particular environmental challenges across industry sectors. A substantial part of this variation reflects the nature of underlying processes in the particular industry sectors. For example, the relative importance of issues concerned with water use in the food sector, the high salience of the management of hazardous waste in the chemical, engineering and electrical manufacturing sectors, the significance of emissions among transport companies, and recycling in retailing.

Figure 22: Environmental challenges facing companies

Panel A: Breakdown by firm size

	Recycling	Waste	Water	Energy	Emissions & Pollution	Hazardous Waste	Climate Change
Large (>250 employees)	12%	67%	22%	73%	55%	27%	20%
Medium (50–249 employees)	10%	61%	13%	45%	26%	35%	6%
Small (<50 employees)	14%	23%	14%	36%	23%	5%	5%
All firms	12%	57%	18%	58%	41%	25%	13%

Panel B: Breakdown by industry sector

	Recycling	Waste	Water	Energy	Emissions & Pollution	Hazardous Waste	Climate Change
Engineering	11%	74%	21%	74%	53%	47%	0%
Chemicals	10%	60%	20%	50%	55%	35%	15%
Retail	27%	64%	9%	36%	14%	14%	9%
Transport	8%	54%	0%	62%	77%	15%	23%
Electrical	10%	20%	5%	50%	20%	35%	15%
Food & Drinks	0%	72%	50%	83%	44%	0%	22%
All firms	12%	57%	18%	58%	41%	25%	13%

A more detailed examination of the responses of companies reveals that the issues of energy and waste, as well as other environmental concerns, have a particular and current immediacy for respondent companies because of fears concerning the rising prices of some resources, energy in particular, and landfill taxes. For example, three typical responses were

'We've never had to pay for using that type of water, now that we are going to be charged for that, that's a major issue for the whole of the industry. We're expecting that to have major financial impacts.'

'The cost is the driver of it all. I'd actually suggest that the price rises in energy over the past 12 months have pushed the environmental agenda.'

'The cost of using energy is going up and the cost of disposing of waste is going up.'

5.3.2 ENVIRONMENTAL MANAGEMENT SYSTEMS AND PROCESSES

The prevalence and nature of systems and processes that firms adopt in order to manage issues have been argued to reflect the character of business responses to those issues (Gupta, 1995). Therefore, this section explores the evidence concerning how firms are managing environmental issues. Participating companies were asked to discuss what systems, plans and processes they had in place in order to manage their environmental impacts. These findings are presented in Figure 23. Looking across the sample, the findings suggest that commonly cited elements of effective environmental strategies such as formal environmental plans, policies, audits of environmental impacts and reviews for these elements are present within only about half of the respondent companies. This figure is substantially lower than figures reported in some earlier studies (e.g., Ghobadian *et al.*, 1995). In broad terms, environmental management processes for companies in this sample appear to be at a fairly early stage with an emphasis on developing plans and auditing impacts rather than setting concrete targets for delivering improvements or systematically reviewing activities and impacts periodically. However, this broad picture masks very considerable variation in environmental management practice across firms of different sizes and between industry sectors.

Panel A of Figure 23 reveals the variation across firms of different sizes with all environmental management practices and processes being substantially more common

among larger companies. For example, three-quarters of large companies have conducted an audit of their environmental impacts. Perhaps most worryingly, systematic environmental management practice is almost absent from firms in the smallest category. Panel B of Figure 23 describes the considerable variation in environmental management activities across industry sectors. There is some evidence that this variation reflects the general importance of environmental issues across these sectors with lower proportions of companies in the relatively 'clean' electrical and retailing sectors adopting most management practices when compared to the 'dirtier' chemical, engineering and food industries. This appears to be particularly evidence for management practices that demonstrate a greater commitment to monitoring and reducing environmental impacts, such as setting targets for environmental improvements and subjecting environmental impacts to external audit.

Figure 23: The prevalence of environmental management processes in sample companies

Panel A: Breakdown by firm size

	Environmental management plan	Environmental policy	Environmental targets	Internal audit	External audit	Annual review	External information
Large (>250 employees)	33%	55%	20%	75%	43%	45%	30%
Medium (50–249 employees)	26%	58%	13%	35%	26%	48%	13%
Small (<50 employees)	5%	23%	9%	18%	14%	9%	14%
All firms	26%	50%	16%	53%	33%	39%	22%

Panel B: Breakdown by industry sector

	Environmental management plan	Environmental policy	Environmental targets	Internal audit	External audit	Annual review	External information
Engineering	26%	68%	16%	63%	42%	58%	0%
Chemicals	10%	45%	20%	50%	45%	45%	20%
Retail	36%	50%	14%	27%	14%	27%	23%
Transport	23%	54%	0%	54%	54%	38%	38%
Electrical	30%	20%	5%	50%	15%	40%	25%
Food & Drinks	28%	61%	39%	78%	39%	28%	33%
All firms	26%	50%	16%	53%	33%	39%	22%

Formally certified environmental management systems have become more prevalent as a means to systematise the management of business environmental impacts (Umweltbundesamt, 2007). The existence of these systems within sample companies is reported in Figure 24. EMAS refers to the EU's Eco-Management and Audit Scheme; other systems include the Welsh Green Dragon, the Responsible Care system in the chemical industry sector, and companies' self-devised systems. Substantially, these findings reflect those discussed above with an overall rate of participation of around 50% and substantial variation across both firm size and industry sector. As above, larger firms in more environmentally harmful industries have a greater tendency to implement formal environmental management systems.

Figure 24: The prevalence of formal Environmental Management Systems

Panel A: Breakdown by firm size

	Environmental management system	ISO 14001	EMAS	Other
Large (>250 employees)	58%	47%	7%	5%
Medium (50–249 employees)	45%	35%	0%	10%
Small (<50 employees)	23%	14%	0%	9%
All firms	48%	37%	4%	7%

Panel B: Breakdown by industry sector

	Environmental management system	ISO 14001	EMAS	Other
Engineering	74%	58%	0%	16%
Chemicals	55%	40%	5%	10%
Retail	23%	14%	5%	5%
Transport	38%	31%	0%	8%
Electrical	60%	60%	0%	0%
Food & Drinks	39%	22%	11%	6%
All firms	48%	37%	4%	7%

Although these observations seem encouraging, examining the detailed responses raises some concerns about the way in which these processes actually support and encourage the more effective management of companies' future environmental impacts. A first concern relates to the operational character of these systems. Typically, respondents suggest that their processes are centred on reviewing the status of the company concerning current environmental issues and impacts. Characteristic responses include

'There are about 30 or 40 internal audits scheduled on every part of the company and each of those audits will include the environmental aspects applicable to that particular area. These audits are done every year.'

'We have an environmental policy at group level and the plan and our impacts are audited annually. Site specific risk assessments also occur where they have environmental management assistance and or other legislative or environmental pressures.'

'It's more of a ticking boxes exercise rather than really looking into what is being done. It's more bureaucracy, red tape.'

A further concern relates to the time horizons over which environmental management processes review progress and reflect on current and future practice. Overwhelmingly, the processes identified by respondents operate over relatively short time spans. Normally, processes operate on annual or six monthly cycles. Only in one case was there evidence of a longer-term strategic planning horizon of both five and 10-year plans. This is a concern because many of the benefits of effective environmental management require that companies take a long-term view of their impacts (e.g., Gupta, 1995; Aragón-Correa *et al.*, 2004); annual planning cycles may not be the best way of achieving this. A further insight into the strategic character of environmental management processes can be gained from looking more deeply into the activities associated with environmental management. Commonly, there was a focus on legislation, for example:

'A lot of my role is to scan legislation and feed that to senior managers of what's coming.'

'Well, you have to keep an eye on the legislation. BSI do a nice little package called Cedric and part of that is 'What's new? What's coming up in legislation?' And it also takes us to other various sources of information on what's coming up.'

In addition to being focused on legislative developments, a significant sub-sample of companies focused on risk or crisis management as the main role played by their forward-looking environmental management processes. Typical respondents highlighted that

'We operate an environmental management system. So basically the process is if we identify annually our review, the impacts associated, if we've any major changes to the

process etc. And I'll review impacts associated with that. We conduct an environmental risk assessment.'

'I also manage the company's business risk review process. So the process there is to look at all risks, environmental included of course, and look at the potential for it going wrong in the future. So we've processes in place to look at that. We've also emergency and crisis management processes in place to deal with that as well.'

'We don't have anything in place. We only have a crisis management. I don't think we've got anything in place for environmental. We have no forward-looking system designed to find out if anything was changing. As I say, we're focusing on what the indicators that we've been given to work with.'

5.3.3 MOTIVATIONS FOR ENVIRONMENTAL MANAGEMENT

In this section I discuss the motivations of companies for engaging in management of environmental issues. As discussed earlier, strategic motivations for managing environmental issues can usefully be thought of as comprising economics-motivated, stakeholder-motivated, and strategy-motivated responses. In order to explore the extent to which firms conceived of the benefits of environmental issues in these terms, respondents were asked what they saw as the main benefits of managing environmental issues and explored examples of particular environmental initiatives that their companies had undertaken. These results are summarised in Figure 25, which, once again, offers a break down by both firm size and industry sector.

Figure 25: Perceived benefits and motivations for managing environmental issues

Panel A: Breakdown by firm size

	Cost reduction / saving	Legislative compliance	Reputation / PR	Customer relations	Managerial motivations	Employee relations	Risk management
Large (>250 employees)	78%	30%	53%	35%	13%	23%	47%
Medium (50–249 employees)	68%	35%	32%	23%	10%	26%	10%
Small (<50 employees)	32%	5%	14%	5%	23%	9%	23%
All firms	66%	27%	40%	26%	14%	21%	32%

Panel B: Breakdown by industry sector

	Cost reduction / saving	Legislative compliance	Reputation / PR	Customer relations	Managerial motivations	Employee relations	Risk management
Engineering	68%	32%	32%	26%	5%	32%	37%
Chemicals	70%	35%	50%	10%	5%	20%	50%
Retail	41%	14%	41%	27%	27%	32%	23%
Transport	85%	23%	31%	23%	23%	46%	38%
Electrical	45%	20%	30%	45%	15%	15%	15%
Food & Drinks	100%	39%	56%	22%	11%	39%	33%
All firms	66%	27%	40%	26%	14%	21%	32%

Broadly, Figure 25 demonstrates that cost reduction, that is to say, an economic driver is overwhelmingly the most significant motivation associated with managing environmental impacts, followed by reputation/public relations, risk management, the desire to deliver environmental improvements and legislative compliance. Consistent with earlier studies (e.g., Florida and Davison, 2001; Ghobadian *et al.*, 1995), this suggests that firm responses to environmental are primarily economic in character and reflect a desire to enhance the financial performance of the firm through waste elimination and improvements in efficiency. While this indicates that businesses are aware of and responsive to aspects of the business case for addressing their environmental impacts, the relative unimportance of motivations associated with stakeholders such as customers and employees is worrying in that it suggests that British businesses may be adopting a relatively narrow view of the benefits of environmental sensitivity. In particular, very few respondents appear to perceive of significant market opportunities that are associated with their environmental improvements.

These characterisations of the motivations for firms surveyed in this study are largely dominated by 'push' factors such as financial pressures, the need to reduce environmental risks and the need to comply with legislation; significant subsets of respondent companies characterise their management of environmental issues as being linked to organizational risks or as problems for their organizations to solve. Virtually none of the respondents highlighted any 'pull' factors or opportunities associated with their management of environmental issues. Judging from the responses of this survey environmental management within the majority of British companies in the year 2006 can therefore not be classified as being, at least not extensively, strategy-driven.

Given this state of affairs, in the following I am trying to analyse why firms have not been able to or interested in making greater progress as part of their environmental strategies. The next paragraphs report the findings with respect to corporate perceptions concerning the most significance barriers and obstacles to a greater engagement with environmental issues. Throughout, I will draw on both general questions asked concerning how firms manage their environmental impacts, and specific questions concerning perceived barriers to improved environmental performance. I begin by reporting responses to a quantitative question concerning barriers to environmental improvements before discussing the qualitative evidence obtained by asking more general questions and probing behind the quantitative evidence. Participating companies were asked to rate the importance of seven potential obstacles to effective environmental management on a seven point Likert-scale

where higher numbers indicate the presence of a more significant obstacle. These obstacles were designed to reflect the existing distinctions between industry and organizational barriers and between internal and external barriers previously identified (Baumast, 1997; Post and Altman, 1994) and to provide a broad benchmark of the most important barriers to more effective management of environmental impacts. The results are presented in Figure 26, below.

Figure 26: Perceptions of obstacles to more effective environmental management

	Big Firms (>250 Employees) (N=97)	SMEs (<250 Employees) (N=68)	All firms (N=165)
Lack of senior mgt support	2.09	2.29	2.16
Lack of skilled HR	2.92	3.13	3.01
Lack of financial resources	2.82	3.32	3.03
Lack of information	2.37	3.54	2.44
Lack of clear regulations	3.53	3.57	3.55
Lack of technology	2.88	2.97	2.92
Lack of demand for green products	3.26	3.11	3.18

Looking at the general pattern of obstacles across all firms, as reflected in the final column of Figure 26 which provides the overall average across the sample, the evidence suggests that difficulties with push factors and the absence of some important pull factors present obstacles to environmental improvements. Specifically, the findings suggest that a lack of clarity in legislative and regulatory initiatives is the most important inhibitor of environmental improvement among sample companies, followed by a lack of demand for environmentally friendly products, a lack of financial resources, and a lack of skilled human resources respectively. Perhaps reassuringly, there appears to be relatively no lack of senior managerial support or deficiency of necessary information among the firms surveyed.

5.3.4 INTERNAL BARRIERS

In order to investigate the possibility within the sample that, as suggested, large and small firms may have different experiences in the context of managing environmental impacts, the companies' responses were again segmented according to the number of employees. The results of implementing this split are provided in the first two columns of Figure 26, above.

In some areas, large and small companies face similar difficulties. For example, both rank difficulties experienced with the clarity of environmental regulations and the lack of green markets as significant challenges. In other areas, however, there are significant differences in the difficulties experienced by large and small companies. In comparison, small companies report greater challenges in all seven areas of obstacles and significantly in terms of lack of clear regulations, availability of financial resources, information, and skilled human resources than do large companies. Thus, small firms face additional and specifically internal obstacles to the effective management of their environmental impacts. Often firms make explicit reference to their size in discussing obstacles to greening. For example, respondents from the food & drinks, and chemicals sectors commented that

'Well capital is a bit of a…, for small businesses capital is a problem and our situation we're kind of farmers and we find it quite difficult to raise money. To meet the capital requirements of just developing the business let alone meeting higher standards of environmental protection, so it's, I'm not saying grants necessarily but we can't even secure loans because we don't have land against which to secure the…'

'I think I'd like to see IPPC reduced in scope, it's a little too…'cause we're quite small plants really so we're like 60 people on each site sort of thing and it's quite onerous for a small company like that really. There is a lot of work and it's not all had a benefit. Yeah, there's a lot of administration involved with it. Some of the things set protection and monitoring programmes and I think they're over the top…Some of the impact assessments I'm asked to do on bio-water run off are ridiculous…There's a conflict with safety as well sometimes.'

In other respects, the findings suggest that small firms have a distinct advantage relative to their larger counterparts in their management of environmental issues. Around a quarter of small companies in the survey reported that a personal motivation to avoid environmental harm was a key part of the reason that their company was taking actions to reduce environmental impacts. In small companies, there is greater scope for individual values and motivations to influence organisational responses and this appears to spur these small companies to make significant strides in meeting environmental goals. For example, two respondents from the electronics and retail sectors commented

'I personally drive it because I am keen about it. You know I don't want to cut down trees. Well (inaudible) camp fire. It's driven predominately by the management team as you see us. It's something that we want to be seen to be involved with.'

'Our company issues are personal issues and because I have two young children, one's 8 and one's 6 ½ and I feel from a relative perspective I know that the world is, in my own opinion, is a time, it's only going to last for long anyway… But I believe we can push that a little and make it last bit longer by doing out little bit to help so obviously I'm more than half way through life so it may not affect me personally… but it, well it will affect me probably but not as much as it will affect my kids. Yeah, I'd say this is a personal issue.'

Literature has highlighted a lack of skilled human resources as a major obstacle to achieving environmental improvements, particularly among smaller enterprises. An initial insight into the availability of the skills, information, and knowledge necessary to manage environmental issues effectively was obtained by asking respondent companies about the human resources that they had dedicated to managing environmental impacts. Less than a quarter of companies in this survey employ a dedicated manager to administer their environmental impacts while environmental management is carried out alongside other responsibilities in over three-quarters of companies. In addition, 71% of respondents used external consultants, often for advice on specialist areas of environmental management or in areas where specialist machinery or equipment is necessary for the measurement of impacts. Looking in more detail at issues concerned with resourcing environmental management, around a fifth of companies report significant difficulties in balancing the management of environmental issues with other organizational responsibilities. The following quotes typify the responses of these companies:

'Managing environmental issues is not the highest priority and everybody's very busy doing their normal jobs, it's something that's been slotted in on top of the day job as it were.'

'It does become difficult to juggle tasks. It's more a personal thing and the support's not there. It's not like, I'm not, it's not that I'm busier than anybody else, it's just the way the company is rather than the…it's a short coming because it has been ignored.'

5.3.5 EXTERNAL BARRIERS

Earlier I articulated two particular barriers to environmental improvements that have their origin external to organisations: difficulties concerned with regulation and concerns regarding green markets. Regulatory difficulties were emphasised as significant obstacles by both large and small companies. In order to explore these issues in greater depth, companies were asked to describe the most important current and future legislative and regulatory challenges they were facing as regards their environmental impacts. In this context, several different issues arise: At one level, companies, particularly small ones, state that the time taken to manage environmental issues is often prohibitive. 14% of companies explicitly cited lack of time as an important barrier to more effective management of their environmental impacts. Figure 27, below, shows an overview of the most frequently recurring themes in the respondents' answers to questions regarding environmental legislation and competition.

The evidence presented in Figure 27 makes clear that, beyond the simple administrative burden requiring cost, time and manpower efforts as a response to legislation and regulation, several specific issues were raised by significant clusters of companies that provide an insight into the range of challenges faced by respondents. Several respondents viewed some environmental interventions as punitive, unfair or counterproductive. The difficulties encountered included the argument that legislation may perversely inhibit environmental improvements in some situations, or that environmental legislation might conflict with countervailing regulatory requirements (for example, those associated with food hygiene, or health and safety).

Figure 27: Respondents' perspectives regarding legislation and regulation

Costliness of legislative compliance	*Emissions legislation relating to our plant. It's mainly the cost of meeting the Emissions Regulations. You know, it can be significant in cost. There's little or no pay back.* *I think a lot of the environmental legislation that comes in is just time consuming.* *It's fairly time consuming, there's a, a lot of bureaucracy in it, you know, a lot of paperwork involved in these things. You know, auditing it as well, so it's really a paper, it's a paper chase all the time – and it's really, you're trying to do all these things with no extra manpower, so while you're doing that you're not doing something else, you know, you're not making whisky.* *And from a legal point of view the, the hassle and the paperwork and the red tape that has to be gone through is particularly time consuming and when you're a business time equals money – so it is necessitating more looking at recycling options for hazardous waste and reducing hazardous waste but when you're looking at the life of assets for a project and it was built with a hazardous waste that we had no control over it, it certainly doesn't make our job any easier.* *So, you know, we are very limited as to what we can do but that doesn't matter, we're still going to get hit with a huge bill. I would be happy for someone to come in and say right, you paid £13,000 last year on this and we've looked over your stuff and realised that 90% of what you use is unavoidable, therefore you should only pay £1,300. You know, that would be the fair way to do it. We don't use excessive packaging here.* *A classic example is we have noise regulations at the London airport – which results in us being fined for using best practice. You then have to turn round and say well, if we're going to be fined for operating the best available equipment in the most environmentally sensitive way, what is the reason for the regulation? Is it simply just to raise money?*
Difficulty in understanding and interpreting regulation and legislation	*It's just getting through the maze of regulations. I don't know if you ever read the WEEE Regulations? Well its practicality that's the problem.* *Well, I think that they go over the top. It's too much, I don't think that they have much of an idea of actually, okay, they sit behind as a government officer, they sit behind a desk and think about these things but are, they're in no way practical. In some of the legislation, it's just not practical so they haven't got much of an idea actually outside.* *I, I think the problem is that if we had somebody give us more guidelines, we'd probably end up being more confused because there's too much legal slant put on it rather than a practical slant... yeah, it's practicalities that's needed here not banging at your door and beating you up. I'm not saying that anybody does that by the way.* *I've found in the last 6 months that it's been very difficult to get information that you're seeking and to get help.* *The waste electronic and electrical equipment directive is, is, is another classic case in point – but that's not about whether you should recycle electronic waste, everyone agrees that would be a good idea, it's about the, the, the idiotic way in which it's being done. We still don't, we, we, you did know, you may not, I'm sure you do, you still realise that in the UK there is still no definition of what electronic and electrical waste is.*
Weak support systems	*I've said "Look, I know it's not your guys fault because you're (inaudible) bloke that turns up at the front door, but their craft of writing legislation for people to understand is sketchy to say the least". I always point them in the direction of the (inaudible) legislation. You'll find it's well written, it's understandable and you get a code of practice. When you come to the Environment Agency, it's not well written, it's (inaudible) and you don't get a code of practice and then you turn it back on to the poor person that's trying to abide by your regulations and say "well, you work it out". And that's exactly their attitude. It's extremely poor when you end up with something so extraordinarily complex such as ITCP. What they will not do from the Environment Agency point of view is actually interpret it because you can ask a regulator a question and he will not give you an answer. But sure enough he will wish to cane you for it if you do it wrong.* *I tell you what does frustrate me, environment agencies up and down the country, their interpretation on the policies put forward by the government or through the EU, their interpretation of those particular rules are not always consistent. You can get, and I have had, different interpretations from one environment agency to another.* *I think they, they, they, the, the conflict between DEFRA and DTI is not at all helpful and with the, the treasury getting in there as well, you've got a, you've got a, you've got a mess. So yes, it withers competitivity without necessarily bringing forth environmental regulations that is as effective as it might be.*

A small minority of companies indicated that they thought that legislation and regulation was not being evenly applied throughout Europe, or even across the UK. This was often exacerbated by weak or uneven policing and enforcement. Others demanded from the government to create a 'level playing field' between large firms and SMEs as the smaller companies could apparently 'dodge' legislative requirements more easily and thereby obtain a competitive advantage. On the other hand, some small firms believed that

environmental legislation poses a threat to their existence, and that it was no surprise to see many firms heading for Asia or other less well-regulated countries.

Finally, companies experienced difficulties with the complexity and interpretation of – in some cases too generic – legislation and felt that they had insufficient access to appropriate advice, that they were being unfairly treated, or that the proper infrastructure especially for waste management and recycling was simply not in place. This was also repeated in the theme of practicality, whereby firms bemoaned a lack of forward thinking in the drafting process of legislation. Quite often companies criticised that, although legislation was designed to reduce the environmental impact of one material resource, the requirements of dealing with this subsequently created other implications elsewhere, which could have reasonably been foreseen. Additionally, many firms were discontented with the lengthy processes of introducing legislation in the first place. In their opinion, this posed severe uncertainty to their strategic business planning and ambiguities with regard to future environmental impacts. Taken together, these observations suggest that companies are experiencing considerable degrees of difficulty in managing their responses to regulation and legislation.

The second domain that earlier studies have suggested may play an important role in retarding corporate environmental responses relates to the presence and character of green markets. In order to gain a clearer insight of the role played by issues concerned with the natural environment in offering market opportunities, participating companies were asked for their views on the importance to their consumers of their environmental performance. In order to gain an insight into the importance of end consumer attitudes and intermediate, business-to-business, opportunities, I also asked participants about the role that environmental performance played in their supply decisions. Analysis of the qualitative responses both confirmed that firms generally thought that effective management of their environmental impacts provided them with few market opportunities and highlighted the circumstances under which environmental aspects were expected to be an important influence on customer decision-making. Perhaps most worryingly, over two-thirds of respondents indicated that their environmental performance played little or no role in shaping the decisions of their customers. Consistent with the approach adopted with respect to legislation and regulation, the main strands of attitudes towards customer pressures and green marketing have been summarised with typical quotes in Figure 28, below.

Figure 28: Respondents' perspectives regarding consumer interest in the environment

Lack of Direct Pressure from Final Consumers	*The customers who we deal with are in a low socio-economic group, so they probably wouldn't always be aware. Very, very few of them are in affluent areas who have knowledge of the issues like this. In the main we're in small working class areas where the people are probably just more interested in the price of bread and milk rather than with anything else.* *We're a high street clothing retailer. So the customers, when they're going off to buy a skirt or a blouse, they don't care about environmental issues.* *I don't think you would lose a customer for poor environmental performance. At the end of the day, the market doesn't want it. They tell you it does, but they don't. Right, so you go down to buy your frozen pizza and there are two pizzas. One's in a lovely shiny box with a picture of a wonderful pizza, the other one's in a crummy old grey looking box which looks a bit iffy and the packaging is damaged. Which one do you buy? For the average consumer, the weaker, the poorer the packaging, the less better it looks on the shelf. And the less better it looks on the shelf, it looks like, if the box is damaged, surely the product would be damaged is the general rule. So the packaging again, everyone, the best packaging is the best product. And that's the way the market works.*
Variable pressure from Business Customers	*I've got to be honest, I'd say it was mixed. In some ways we'll get pressure to sort of keep our packaging to the minimum and then, you know, the next conversation will be do something along the lines of shelf ready packaging which is actually increasing the amount of packaging that we, we have to supply to them – so it's sort of quite mixed messages, it, it depends on what their focus in on at the moment and I don't consider any of the major UK retailers to be particularly focussed on environmental concerns at the moment.* *We have a few customers who talk to us about how we're managing our impact on the environment now the environmental policy… It would be fair to say that in a lot of cases that tends to be unsubstantiated words and policies rather than real actions and audits. It's almost like somebody in the organisation says we need an environmental policy which must include our suppliers. But I don't believe for example that we've ever won or lost a piece of business on our environmental performance.* *No it's not a big pressure, I mean we have, well I don't know if you're aware but a lot of companies will send you out a big questionnaire that has lots of questions on it and all the questions that come up on that are quite often about environmental systems. I think at the moment you get the impression that this is something that they do for their systems and is a matter of course rather something that would affect whether they bought from us. It's more of a ticking boxes exercise rather than really looking into what is being, It's more bureaucracy, red tape.* *We have pressure from customers to have management systems. Well if you're selling to supermarkets they want everything fully auditable but that's also a good business practice.*

Examining these multi-faceted views of the companies in more detail suggests that the lack of market demand for green products and the lack of customer pressure, in part, stems from perceptions of the difficulty in reducing environmental impacts while maintaining perceptions of high product quality among consumers. In this regard, quality and price were still dominating customers' perceptions and priorities, while consideration for environmental impacts was either not existent, fraught with mixed messages about actual expectations or somewhat taken for granted without need for explicit pressure. On the whole, customer pressure for effective environmental management appeared to be varying, mainly depending on industry sector and firm size. Environmental management standards such as ISO 14001 were seen as the minimum requirement for consideration as a supplier in sectors such as the aeronautical or automotive industries; this form of pressure was by far the most frequently mentioned, however, it was also closely followed by many firms in other sectors where there were absolutely no environmental pressures from customers whatsoever. Only very rarely did firms seem to take a proactive approach and market their environmental awareness and knowledge to potential customers, thereby educating them and targeting special customer requests and new markets. In other cases, this was mainly

portrayed as a PR and image exercise to cater for the few environmentally conscious customers.

Looking more deeply within those companies that indicated their management of environmental impacts might play an important role in attracting and retaining customers suggests that even in these cases environmental performance plays only a relatively superficial role in shaping consumer attitudes or that it reflects pressures associated with particular export markets. For many, perceived customer pressures amounted to 'tick box exercises' or 'sending in the firm environmental policy', which were extremely seldom followed up by actual on-site visits or audits. Often, those customers applying pressure with regard to environmental issues were too few in number to warrant any greater efforts with respect to improving environmental management beyond compliance with legislation.

Obviously for the majority of firms, pull factors such as customer pressures for effective environmental management and green products are either completely non-existent, or alternatively, are rigorously enforced through EMSs. This latter mechanism relies heavily on third-party certification and again consequently resembles much more the pressure of compliance with legislation rather than a truly proactive stance towards environmental management.

5.4 DISCUSSION

The study in this first empirical chapter set out to examine the state of environmental strategy among British companies in the year 2006. The findings indicate that while British companies appreciate the imperatives to address environmental impacts and are generally taking actions to improve their firm's environmental performance, systematic and strategic management practices in the context of managing environmental issues are relatively rare. Moreover, where they exist, environmental management practices are commonly oriented to coping with current legislation, extracting short-term economic benefits, and avoiding risk. Motivations for engaging in environmental management are found to be overwhelmingly economic in character and, within this, dominated by the goal of cost reduction. Energy use and waste management appear to have the greatest salience in terms of presenting environmental challenges for companies throughout the sample.

Notwithstanding the prevalence of economic drivers of environmental management both an environmental manager and a director of sustainability tentatively expressed that they

perceived benefits in terms to improved employee awareness and motivation. Similarly, some firms reported that environmental management was largely driven and supported by employees, which would suggest that the human resource management function may harbour greater environmental and hence potentially also economic benefits than so far recognised and utilised. Occasionally firms also mentioned obtaining a 'licence to practice' by being responsible for the general environment of the surrounding communities as a motivation to engage in environmental practices. This illustrates the potential threats in terms of reputation and image that could pose wider economic ramifications for a firm if it were to neglect its impact on the immediate environment. Broadly, the findings suggest that the practices and systems associated with proactively managing environmental issues are only patchily evident within sample companies. The analysis in this article emphasises the essentially short-term character of environmental policy in the sample companies. While a significant proportion have instituted formal environmental audit and management systems interviewee responses suggest that these systems operate over relatively short time horizons. Little evidence was found of a firm link between these processes and strategic decision making within the participating companies. Environmental changes are likely to have profound effects for British companies and if they are to respond and adjust effectively it is important that these developments are reflected in longer-term planning and strategic processes.

Existing conceptual and empirical contributions emphasise the significant payoffs available to companies that manage their environmental impacts effectively (Aragón-Correa *et al.*, 2004; Christmann, 2000; Hart, 1997; Porter and van der Linde, 1995). In spite of this, empirical evidence concerning the extent to which companies have embedded environmentally sensitive business practices within their business practices remains very mixed (Ghobadian *et al.*, 1995; Hillary, 2000; Post and Altman, 1994). The findings in this chapter suggest that both internal and external barriers play important roles in retarding the willingness and ability of British industry to become more proactive in managing its environmental impacts.

The analysis highlighted that firms perceived of significant barriers to improved environmental management that lay both within the organization and that were attributable to external factors. The largest difficulties concerned factors external to the organization, including significant difficulties involved with interpreting, understanding and responding to legislation and regulation and a lack of consumer demand for green products. Inside the firm, the main obstacles were focused upon a lack of financial resources to implement

environmentally sensitive solutions and a lack of skills to manage environmental issues more effectively.

Furthermore, the findings suggest that smaller businesses face particular challenges in developing and implementing environmental strategies. Consistent with earlier studies, it transpired that large and small firms experienced barriers towards more proactive environmental strategies to different degrees with internal resource constraints being relatively more important for small companies and the absence of green market opportunities being more important for larger companies. It is therefore important that legislative initiatives are designed with their particular needs in mind.

Comparison with earlier studies such as Ghobadian *et al.*'s (1995) analysis of the state and character of environmental management in the UK in 1994 affords some insight into the development of environmental practice in British industry over time. Both studies report a significant emphasis on cost reduction as a key motivator for environmental engagement and a strong link between environmental management and legislation, suggesting that UK companies retain an orientation to evaluating environmental issues by reference to their relevance to the bottom-line economic considerations.

Reflecting on the conceptual framework as detailed in Chapter 3, it would appear that this reactive stance towards environmental issues, and to a certain degree the tendency towards environmental strategy inertia across time as suggested by comparison with earlier work, represents a relatively simple fitness landscape for firms. More precisely, the contribution that environmental management can make in these firms towards reaching peaks on the fitness landscape is mainly defined by simple cost cutting operational processes, compliance with legislation, and strong risk management procedures. At the same time, internal and external barriers possibly represent some of the conflicting constraints in the quest towards satisficing organisational fitness. However, only a properly conducted longitudinal analysis can uncover the long-term evolution of corporate environmental strategy among firms.

5.5 CHAPTER SUMMARY

This chapter of the thesis has provided a first static assessment and characterisation of the state of corporate environmental strategy among UK firms in the year 2006. In so doing, it has taken a snapshot in time of the status quo with regard to firms' environmental

management practices and behaviour. The prevailing sense of analysis of this state of environmental management is one of firms being predominantly reactive in their general outlook, with the main emphasis being placed on cutting costs, complying with environmental legislation and regulations, and managing adverse risks. Comparison with earlier research suggests that firms have not changed all that much in this regard and that firms' longitudinal behaviour in terms of environmental strategy could thus be characterised as displaying relative inertia. In isolated cases, however, more advanced strategies have been observed where firms have been adapting to changing circumstances and where respondents believed competitive advantage from more proactive engagement with environmental issues could be obtained. The following chapters will explore the longitudinal development of corporate environmental strategy in more detail.

CHAPTER 6: MUCH ADO ABOUT NOTHING?

ORGANISATIONAL CHANGE AND EVOLVING CORPORATE ENVIRONMENTAL STRATEGY IN THE UNITED STATES

6.1 INTRODUCTION

Chapter 6 contributes to the development of research concerned with environmental strategy and organisational change. Specifically, it explores the evolving pattern of environmental strategies among a sample of large US companies drawn from a variety of industry sectors over the time period 1997-2006. In so doing, it makes two substantive contributions. First, it will conduct the first systematic analysis of organisational change in the context of environmental strategies. Because of the longitudinal coverage of this sample and its broad industry coverage, the analysis is able to examine the degree to which business environmental strategies have changed over time and to distinguish between changes in the behaviour of individual firms and changes in the overall pattern of corporate responsiveness to the natural environment that arise from the changes in the composition of the population of large American companies. By examining how companies are changing their responses to environmental concerns over time, the aim is to shed light on significant debates surrounding the drafting of effective environmental policy solutions.

Second, it contributes to the ongoing conversations in the conceptual literatures concerning the nature of change processes and how these are contingent upon the content of the change that is desired and the context within which research is undertaken. Theoretically, the research in this chapter is grounded in Burgelman's (1991) autonomous and induced perspectives of strategy-making based on the recognition that any corporate strategy is not a static but a dynamic process, which continuously shapes the organisation and which is affected by a multitude of factors and actors (Bartlett and Goshal, 1991; Pettigrew, 1992; Stacey, 1995). Specifically, I study the evolution of corporate environmental strategy by examining four strategy processes, namely inertia, adjustment, reorientation, and strategic renewal (Burgelman, 1991). In summary, Chapter 6 has the aims:

- To study the evolution of corporate environmental strategy among a population of US firms over the course of a 10-year period;
- To identify whether this evolution displays any patterns across the population;
- To assess whether the conceptual framework outlined in Chapter 3 is valid in this particular context.

The remainder of this chapter is structured as follows. The next section introduces the theoretical background followed by an application to the field of environmental strategy.

Subsequently, I present the results before concluding this paper with a discussion of the findings including some recommendations as to how policy-makers and managerial practitioners ought to respond to the results.

6.2 THEORETICAL BACKGROUND

Increasing concerns relating to environmental degradation and climate change have stimulated considerable academic, societal, political, and institutional attention in recent years (Banerjee, 2003; Child *et al.*, 2007; Hoffman, 2005; Jennings and Zandbergen, 1995; King, 2007; Shrivastava, 1994). There is a growing recognition that the solution to these pressing environmental issues requires a collaborative response from multiple stakeholders in society (European Commission, 2001). For example, the Intergovernmental Panel on Climate Change states 'greater cooperative efforts to reduce emissions will help to reduce global costs for achieving a given level of mitigation, or will improve environmental effectiveness' (IPPC, 2007: 21). Against this backdrop there are also particular pressures upon business organisations to devise and implement organisational and technological responses that enable them to comply with rising legislative hurdles and to meet the heightened economic pressures that have accompanied growing global competition and demand for increasingly scarce natural resources (The Economist, 2008). Anecdotal evidence seems to suggest that firms are indeed responding to these pressures in a variety of ways (for example, Hart and Milstein, 2003; Hoffman, 2005; Kolk and Pinske, 2004; Lash and Wellington, 2007).

These developments have stimulated the growth of a large body of academic research that has sought to understand how and why business organisations are managing their environmental impacts within a diverse range of contexts (Etzion, 2007). This research has established typologies of corporate environmental responses (Roome, 1992; Winn and Angell, 2000), shed light on the impact on financial performance of engagement with environmental issues (Bansal and Clelland, 2004; Orlitzky *et al.*, 2003; Russo and Fouts, 1997; Scharfman and Fernando, 2008), raised awareness of how environmental issues are understood and responded to within organisations (Bansal, 2003; Bansal and Roth, 2000; Delmas and Toffel, 2008; King, 2000; Roome and Wijen, 2006), and advanced a wide range of theories concerning environmental management that have their roots in sociology, economics, psychology, and other disciplines (e.g., Cordano & Frieze, 2000; Crotty, 2006; Delmas *et al.*, 2007). However, existing empirical research concerning organisational responses to environmental issues generally suffers from a number of problems. First,

many existing studies confine their attention to small groups of companies active in particular industry sectors, often those recognized as having a significant environmental footprint (Hoffman, 1999). This limits the ability of the research to speak to general questions concerning how firms are responding to environmental issues. Second, empirical research is generally cross-sectional in design and is therefore unable to address issues relating to how either individual businesses, or the general population of business organisations, are changing their environmental sensitivity over time (Kallio and Nordberg, 2006). The relatively small amount of longitudinal research that exists, for example Lee and Rhee's (2007) study of South Korean pulp and paper companies, and Bansal's (2005) study of Canadian forestry, mining, and oil and gas firms, tend to focus on small numbers of companies within specific industries. Hence, while existing research is able to shed light on how change is occurring in environmental management over time for some companies, it is unable to reveal how environmental management is evolving within the population of companies generally.

The environmental strategy of an organization has been defined as 'a pattern in action over time intended to manage the interface between business and the natural environment. […] Environmental strategy refers to outcomes in the form of actions firms take for regulatory compliance and to those they take voluntarily to further reduce the environmental impacts of operations' (Sharma, 2000: 682). Thus, for the purpose of the research I will conceptualise change in corporate environmental strategy as the result of *both* changes in legislative compliance *and* environmental proactiveness. This understanding entails firms' active commitment to maintaining levels of environmental management, which avoid breaking the increasing number of evermore-stringent environmental legislation and requires them to make technological and operational adjustments. On the other hand, it comprises proactive behaviour designed to engage voluntarily in activities that serve to exploit commercial opportunities in a sustainable manner. Any change in a company's environmental strategy could thus be caused either by changing its legislative compliance, or alternatively by altering its commitment to implementing green product and process innovations, or a combination of both. Ultimately, I am concerned with the aggregate effects of observable behaviour – as opposed to mere rhetoric and policy (Rhee and Lee, 2003; Winn and Angell, 2000) – even if this permits a firm to some extent to trade off compliance with proactiveness.

6.2.1 THEORIES OF ORGANISATIONAL (CHANGE) BEHAVIOUR

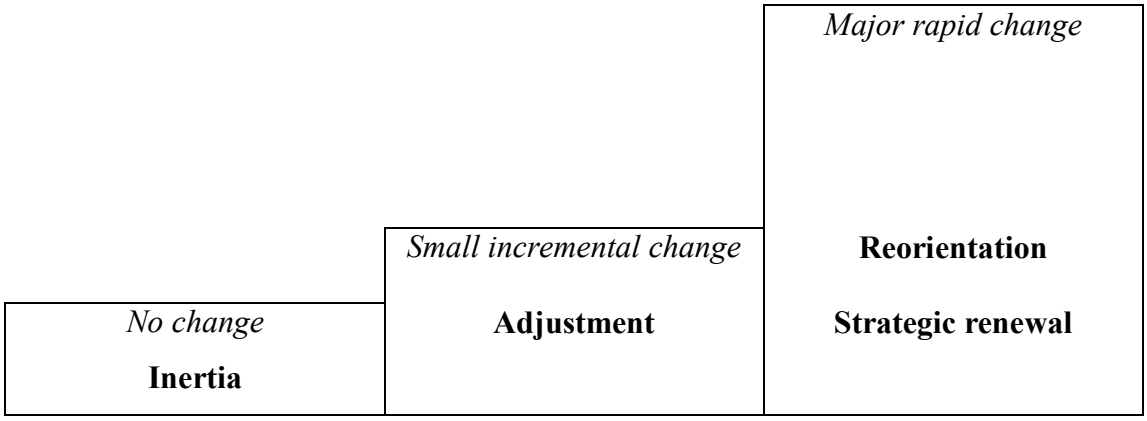
Theoretically, the research of evolving environmental strategies is grounded in Burgelman's (1991) conceptualisation of strategic change. Burgelman's framework depicts organisational change as arising out of an evolutionary process whereby patterns of variation, selection and retention influence changing organisational strategies and actions (Burgelman, 1991). Burgelman developed his framework in the specific context of strategic change at Intel, but his work has also been applied to firms in manufacturing (Lovas and Ghoshal, 2000) and the wider computing industry (Brown and Eisenhardt, 1997). Central to the conception of change explored here in this chapter is the distinction between 'induced' and 'autonomous' strategic actions. Induced change processes relate to 'major epochs, periods of quantum change, and reorientations' (Burgelman, 1991: 242) that are often stimulated by external technological or institutional pressures and typically 'resemble the traditional top-down view of strategic management' (Kjærgaard and Kautz, 2008: 289). In contrast, autonomous change processes relate to the 'ongoing process of strategy making in organisations' (Burgelman, 1991: 242) and are generally 'driven by impetus from the bottom of the organization rather than plans' (Kjærgaard and Kautz, 2008: 289). Burgelman (1991) argues that individual organisations will at various times, or in different places at the same time, exhibit elements of both types of change process and that, because of this, his framework can be seen as an attempt to integrate the two streams of earlier research that had considered induced and autonomous change separately.

More specifically, Burgelman (1991) identifies four archetypes of organisational change that can emerge from various configurations of autonomous and induced strategic processes. The four archetypes are: relative inertia, adjustment, reorientation and strategic renewal. Essentially, these four archetypes can be broken down into three groups of firm behaviour with the main differences being: no change (relative inertia) versus change (other three types), and small, incremental change (adjustment) versus major rapid change (reorientation and strategic renewal) (see Figure 29, below).

Relative inertia arises when the drive for organisational 'Survival motivates conservatism on the part of top management and desire to leverage existing organizational learning through induced process [leads to] reluctance to change organizational strategy' (Burgelman, 1991: 254). Scholars such as Boeker (1989), Hannan and Freeman (1984), and Miller and Friesen (1984) characterise strategy as being comparatively inertial and claim that organisations tend to continue with their strategy instead of radically changing it. As Huff *et al.* (1992) highlight 'inertia is most succinctly defined as the level of

commitment to current strategy. It describes the tendency to remain with the status quo and the resistance to strategic renewal outside the frame of current strategy' (Huff *et al.*, 1992: 56).

Figure 29: Four types of change behaviour in organisational strategy



Burgelman's (1991) second archetype is termed *adjustment*; it is 'typified by relatively minor changes in strategy to accommodate environmental change' (Burgelman, 1991: 254). Adjustment is consistent with the strategic choice perspective (Cyert and March, 1963; Child, 1997), which proposes that organizational changes are only in part induced by responses to environmental conditions and that much more importantly managerial choices determine organizational structure and processes (Miles *et al.*, 1978). Managers attempt to adapt to three broad problems (Miles *et al.*, 1978) and as a result, 'change takes place because most of the time most people in an organization do about what they are supposed to do; that is, they are intelligently attentive to their environments and their jobs' (March, 1981: 564). They do this by using 'rules, problem solving, learning, conflict, contagion, and regeneration to cope with the environment, actively adopt to it, avoid it, seek to understand, change, and contain it' (March, 1981: 565).

Change characterised as *reorientation* involves 'major changes in strategy in response to major environmental change' (Burgelman, 1991: 254). Often phrased antithetically to the adaptation perspective stands punctuated equilibrium theory, which fundamentally 'depicts organizations as evolving through relatively long periods of stability (equilibrium periods) in their basic patterns of activity that are punctuated by relatively short bursts of fundamental change (revolutionary periods)' (Romanelli and Tushman, 1994: 1141). Three barriers (cognition, motivation, and obligation) to radical change in human systems are meant to explain the resistance to organizational change (Gersick, 1991). On the other hand, both internal and environmental changes that threaten the system's ability to obtain

resources are listed as the main sources of disruption to an organization's inertia and thus as the antecedents to those punctuated bursts of change (Gersick, 1991).

Lastly, change can take the form of *strategic renewal*, involving 'major change in organizational strategy preceded by internal experimentation and selection [which] offers [the] organization possibilities for anticipatory adaptation to new environmental demands and/or to enter new niches' (Burgelman, 1991: 254). Whereas reorientations are mainly governed by external selection processes, strategic renewal describes an organisation's ability to develop autonomous change initiatives, which are preceded by internal experimentation and selection before they eventually emerge as the organisation's new direction. Rather than having to 'bet the firm' in order to counteract imminent external threats (as in the reorientation process) organisations anticipate commercial changes and thus test the waters internally before fully capitalising on new skills and capabilities. This process happens without a clear understanding of how exactly the environment will eventually evolve and depends on 'individuals seeking expression of their special skills and career advancement through the pursuit of different types of strategic initiatives' (Burgelman, 1991: 240).

6.2.2 ORGANISATIONAL CHANGE AND ENVIRONMENTAL STRATEGY

Having outlined the broad conceptual approach and identified four archetypal organisational change processes, I am now in a position to place this framework in the particular context of environmental strategy. In what follows, I will address both the different characters of changes in environmental strategy and their specific causes. The wider discourse on organizational behaviour has led to several typologies of environmental strategies emphasising the degree of corporate environmental responses. The most common typology was introduced by Roome (1992) whose strategy types of 'non-compliance', 'compliance', 'compliance-plus', 'commercial and natural environmental excellence', and 'leading edge' were subsequently modified by many others (Sharma, 2000; Sharma and Vredenburg, 1998; Winn and Angell, 2000). These typologies are based on detailed analyses of internal responses to environmental issues and require insight into firms' processes and decision-making. However, with exception to Winn and Angell (2000) these classifications are all static and thus do not allow a description of the transition paths from one class of strategy to another. A generally tacit assumption exists that there is a only linear and positive transition from the non-compliant type of environmental strategy towards more environmentally proactive strategies over time

(Berry and Rondinelli, 1998). Recently, however, doubts have emerged as to whether 'proactive environmental management' is or can be beneficial at all for all companies in all circumstances (Aragón-Correa and Rubio-López, 2007; Christmann, 2000; Orsato, 2006; Shelton, 1994; Shelton and Shopley, 1996).

In my view, the theory of relative inertia is paralleled in the environmental literature by discussions about internal and external barriers to proactive environmental strategies (see also Chapter 5.2.4 and 5.2.5; Murrillo-Luna *et al.*, 2007; Post and Altman, 1994). A variety of causes have been identified that appear to retard firms' willingness and ability to change their environmental strategy. Hence, I surmise that many firms can be perceived as being inert with respect to environmental strategy (Relative inertia). Either, firms do not do anything with regard to implementing environmental responses, or they continue with a reactive compliance-oriented strategy, or, unlikely, they have settled into a more proactive way of consistently following an environmentally innovative strategy. Consequently, impeded by internal and external barriers many firms tend not to change their environmental strategy over time and are hence characterised by inertia.

On the other hand, analyses of the effects of internal greening processes such as policy commitment to, and implementation of, corporate environmental management activities (Winn and Angell, 2000) as well as studies of the impacts of voluntary self-regulation (King and Lenox, 2000; King *et al.*, 2005) and industry legislation (Berry and Rondinelli, 1998; Orsato *et al.*, 2002; Porter and van der Linde, 1995) are designed to shed light upon firms' profiles of environmental strategies. Growing environmental legislation and regulation will undoubtedly have played a major role in forcing firms to improve their compliance over the past ten years (Orsato *et al.*, 2002). Pollution prevention and pollution control therefore form a key part in many firms' environmental strategies (Hoffman, 2005; King and Lenox, 2002). Equally, firms are believed to obtain various benefits from taking other more proactive steps (Porter and van der Linde, 1995; Orsato, 2006) such as environmental management system adoption (Boiral, 2007; da Silva and Teixeira, 2008; King *et al.*, 2005) and environmental supply chain management (Darnall *et al.*, 2008; Rao and Holt, 2005; Srivastava, 2007). Discussions in the organisational change literature focus on the extent and rate of change, this being either small and incremental, or large and rapid (Snow and Hambrick, 1980). Although ultimately both may be different forms of adjustment, their respective causes are disputed and often attributed to whether they affect an organization's core or its periphery (Hannan and Freeman, 1984). Given the lack of empirical evidence regarding transitions between corporate environmental strategy states, I

suspect that firms are making step-by-step progress by continuously complying with changing and tightening legislation and responding to other industry pressures (Adjustment). Many firms therefore gradually and incrementally change their environmental strategy by adjusting their routine behaviour and implementing changes to the periphery of their businesses.

By contrast, exogenous influences are argued to have the capacity for triggering second-order organisational change (Meyer *et al.*, 1990). According to Gersick 'environmental changes that threaten the system's ability to obtain resources' (1991: 21) are causing disruption to inertia and, in accordance with punctuated equilibrium theory, Romanelli and Tushman (1994) find support for the ability of extra-systemic pressure to initiate fundamental transformation. It is therefore conceivable that firms radically change their environmental strategy in form of rare punctuated bursts. These revolutionary shifts of environmental strategies are caused by responses to exogenous shocks when at all other times firms operate in a state of inert equilibrium (Reorientation). More specifically, a variety of firms' external pressures, such as environmental shareholder resolutions (Graves *et al.*, 2001), environmental crises (Klassen and McLaughlin, 1996), changes in oil price, and introduction of new legislation (McKay, 2001) may be positively associated with rapid and discontinuous change behaviour with respect to environmental strategy and which may instigate fundamental alterations to the core of the business. These core aspects of an organisation have been summarised as a company's stated goals, its forms of authority, its core technology, and its marketing strategy (Hannan and Freeman, 1984).

While the previous type of major rapid change behaviour was based on punctuated equilibrium theory, another explanation for large and rapid organisational change in environmental strategy is grounded in the strategic choice and adaptation view of change (Cyert and March, 1963; Child, 1997). This perspective argues that firms' top management decides for itself in how far it can determine organizational structures and processes necessary for dealing with the 'three broad problems' as opposed to letting conditions in the business environment dictate them (Miles *et al.*, 1978). Particularly, the administrative problem requires management to reduce uncertainty about current structures and processes without at the same time constraining any potential future activities. 'The administrative system must facilitate the organization's future capacity to adapt by articulating and reinforcing the paths along which innovative activity can proceed' (Miles *et al.*, 1978: 548). This dilemma was characterised as the trade-off between exploitation and exploration (Larsen and Lomi, 1999; March, 1991) and many firms hope to overcome it by allocating

financial and human resources to their research and development function (R&D). In fact, the environmental literature has widely studied the significance and impacts of research and development on the implementation and improvement of environmental management (Christmann, 2000; Sharma and Vredenburg, 1998) particularly with respect to the introduction of beneficial products and processes (Hart and Milstein, 1999, 2003; Khanna and Anton, 2002; King and Lenox, 2002; Newman and Hanna, 1996) Thus, many firms may change their environmental strategy in form of major strategic renewal, which is caused by internal search and selection processes within the R&D function (Strategic renewal).

6.3 METHODS

6.3.1 DEPENDENT VARIABLE

Consistent with the conceptual framework developed in Chapter 3 and the KLD data sampling process outlined in Chapter 4.4, I first calculated the net level of environmental strategy in a given year ($LEVENVSTRAT_{(t)}$) consisting of the sum of several environmental strengths (A - beneficial products and services; B - pollution prevention; C - recycling; D - clean energy; G - management systems; and X - other strengths) minus the sum of the two concerns B (regulatory problems) and D (substantial emissions) (*cf.* Hillman and Keim, 2001; Rehbein *et al.*, 2004). The reasoning behind this computation was to incorporate both firms' lack of concern for environmental regulations and emissions (and thus inherently a more passive stance towards – or in other words, an active neglect of – environmental issues) and their potentially more proactive steps as represented by the strengths categories. Thus, on aggregate a firm's potential annual level of environmental strategy could range from -2 to +6. Based on Roome's (1992) taxonomy of environmental strategies firms were then classified accordingly: Non-compliance (level of environmental strategy -2 or -1); compliance (0); compliance-plus (1); commercial and natural environmental excellence (2); leading edge (3+). While this classification of environmental strategy can arithmetically be the result of several combinations of strengths and concerns, based on the data available it broadly reflects a firm's overall environmental strategy orientation in a given year. It does, however, only present a limited view of the whole spectrum of firms' potential environmental strategies. Issues such as, for example, efficient use of natural resources and stakeholder engagement are not included and this absence may hence distort the overall picture of what firms are actually doing with respect to the environment.

Although the aim for this research was to investigate long-term trends, a flexible definition of change in environmental strategy was employed. I analysed changes in a company's environmental strategy for increases or falls in the overall levels of environmental strategy over one, two, three, four, five, and nine years time of data observations (CHLEVENVSTRAT1…CHLEVENVSTRAT9).

6.4 FINDINGS

This section presents the findings from the analyses by investigating the changes in environmental strategy first in the contemporaneous and then in the balanced sample. By comparing the findings across these two samples the aim is to shed light on the relative importance of the changing composition of economic activity (as reflected in the contemporaneously defined S&P 500 sample) and changing firm behaviour (as reflected in the balanced panel sample) for changing corporate responses to the natural environment.

6.4.1 CONTEMPORANEOUS S&P500 SAMPLE

First, I calculated the changes in the level of environmental strategy for every company-year observation for various time periods (Figure 30). This allowed understanding whether, and in how far the level of environmental strategy varied not only from one year to the next but also for longer periods of observation. Out of the initial 4775 firm-years, a large number of data points were missing in the analysis since it was impossible to measure change to the first year of a firm's inclusion into the database and I equally had to omit firms that appeared only for a single year in the database. The number of missing cases naturally increases the greater the period of observation.

Figure 30: Changes in levels of environmental strategy over different time frames (contemporaneous sample)

CHANGE IN ENVIRONMENTAL STRATEGY

		-3	-2	-1	0	+1	+2	+3	+4	+5	Total
1 Year Change	N	0	16	263	3429	261	36	4	1	0	4010
	%	0.0	0.4	6.6	85.5	6.5	0.9	0.1	0.0	0.0	100
2 Year Change	N	1	38	274	2656	284	50	11	3	0	3317
	%	0.0	1.1	8.3	80.1	8.6	1.5	0.3	0.1	0.0	100
3 Year Change	N	3	50	253	2068	252	61	13	1	0	2701
	%	0.1	1.9	9.4	76.6	9.3	2.3	0.5	0.0	0.0	100
4 Year Change	N	6	51	222	1567	229	62	15	2	0	2154
	%	0.3	2.4	10.3	72.7	10.6	2.9	0.7	0.1	0.0	100
5 Year Change	N	5	51	159	1174	215	52	14	4	1	1675
	%	0.3	3.0	9.5	70.5	12.8	3.1	0.8	0.2	0.1	100
9 Year Change	N	2	8	30	135	45	15	8	1	0	244
	%	0.8	3.3	12.3	55.3	18.4	6.1	3.3	0.4	0.0	100

Studying the frequency distribution of the various changes in environmental strategy across the sample I noticed one of the most striking findings of this study: the very high frequency of zero change across all firm-year observations regardless of time frame. For example, looking at the extent of change in environmental strategy from one year to the next, over 85% of the firm-year observations exhibit no change in the level of their environmental strategy. By moving down the rows of Figure 30, it is possible to look at changing environmental strategy over longer time horizons. Since developing improved responses to environmental issues often involves substantial investments that may take a significant amount of time to implement, one would expect to observe greater degrees of change in strategy over longer horizons. However, while this is broadly what can be observed, a very substantial proportion of observations exists which exhibit no change, even over the longest time horizons. For example, over three-quarters of observations exhibit no change over a 3-year period and more than 55% of observations had 'no change' in their environmental strategy over a 9-year time horizon. Thus even over long periods of time more than half of the firms under observation have not changed their level of environmental strategy, and therefore, I conclude that there is a very high degree of inertia exhibited in environmental strategy over time. However, it must be noted that the pattern of change tells us nothing about the overall level of engagement with environmental issues, something to which I will return below.

I will now consider the nature of what change there is in environmental strategy over time. Although the sample is dominated by inertia, there is a reasonable amount of change, particularly over longer time periods. Where change does occur, it occurs with greatest frequency in the +1 or -1 categories, with between 13.1% and 30.7% of sample observations exhibiting this level of change. This observation indicates that where changes in environmental strategy do take place they happen for their most part gradually as opposed to leaping more dramatically. This suggests that most change in environmental strategy occurs out of incremental processes, rather than radical redesigns or strategic reorientations. Concerning the direction of change, the evidence presented in Figure 30 highlights that change is as likely to be negative as positive, particularly over shorter time horizons. Given the growing salience of environmental issues within wider society, this is a particularly surprising and troubling observation.

Regarding the level of environmental strategy, Figure 31, below, shows the distribution of levels of environmental strategy across time. It is noticeable that across all years the vast majority of firms had a level of environmental strategy of zero, a state that was characterised as the environmental strategy class of 'compliance'. Of these 'compliance' observations for all years, 93% had neither any strengths nor concerns with the remaining 7% being firms where 1(2) strengths and 1(2) concerns cancel each other out. Across the years, this dominance of compliance-oriented firms does not change to a significant extent with percentages ranging from 65.5% in 2006 to as high as 79.2% in 2003. Similarly, firms being classified as non-compliant (levels -2 and -1) appear to represent roughly 13% in every year. The most noteworthy development, however, has to be the recent positive shift in the table for firms having environmental strategy levels of +2, +3 and +4. This trend of firms evolving towards the environmental strategy classes of 'commercial & natural environmental excellence' and 'leading edge' starts in 2004 and becomes more pronounced in 2005.

However, as indicated earlier this sample is problematic in so far as it consists of a varying composition across the years; firms enter the S&P500 index, they merge, or are removed from the index for various reasons. It therefore does not tell us very much about the changing environmental strategy of individual companies over time. For this reason I will now turn the attention to the balanced panel of companies.

Figure 31: Distribution of levels of environmental strategy across different years (contemporaneous sample)

		LEVEL OF ENVIRONMENTAL STRATEGY							
		-2	**-1**	**0**	**+1**	**+2**	**+3**	**+4**	**Total**
All years	N	147	478	3500	549	79	20	2	4775
	%	3.1	10.0	73.3	11.5	1.7	0.4	0.0	100
1997	N	14	47	321	75	6	0	0	463
	%	3.0	10.2	69.3	16.2	1.3	0.0	0.0	100
1998	N	17	40	329	68	8	0	0	462
	%	3.7	8.7	71.2	14.7	1.7	0.0	0.0	100
1999	N	11	50	346	56	5	0	0	468
	%	2.4	10.7	73.9	12.0	1.1	0.0	0.0	100
2000	N	12	45	364	53	6	0	0	480
	%	2.5	9.4	75.8	11.0	1.3	0.0	0.0	100
2001	N	19	54	363	42	6	0	0	484
	%	3.9	11.2	75.0	8.7	1.2	0.0	0.0	100
2002	N	14	41	380	50	4	0	0	489
	%	2.9	8.4	77.7	10.2	0.8	0.0	0.0	100
2003	N	12	42	388	43	5	0	0	490
	%	2.4	8.6	79.2	8.8	1.0	0.0	0.0	100
2004	N	19	55	379	35	6	1	0	495
	%	3.8	11.1	76.6	7.1	1.2	0.2	0.0	100
2005	N	15	56	336	65	13	10	0	495
	%	3.0	11.3	67.9	13.1	2.6	2.0	0.0	100
2006	N	14	48	294	62	20	9	2	449
	%	3.1	10.7	65.5	13.8	4.5	2.0	0.4	100

6.4.2 BALANCED PANEL OF COMPANIES

After screening the sample to include only companies that were permanently represented in the S&P500 sample ranked by KLD for the years 1997 to 2006, 226 firms remained for investigation. The first step in the analysis was to examine the prevalence of change in environmental strategy for a variety of time horizons. As Figure 32, below, illustrates the findings are substantially the same as the observations for the contemporaneously defined sample. For example, 83% of firm-years do not change their environmental strategy over one-year periods with this figure gradually falling to 55.8% for change over 9 years. That the pattern in the overall level of change in environmental strategy is very similar in the two samples that were analysed before strongly suggests that change (and its absence) over

time in environmental strategies is attributable to changing firm behaviour rather than the changing composition of leading American companies.

Figure 32: Changes in levels of environmental strategy over different time frames (balanced sample)

CHANGE IN ENVIRONMENTAL STRATEGY

		-3	-2	-1	0	+1	+2	+3	+4	+5	Total
1 Year Change	N	0	7	150	1689	160	25	3	0	0	2034
	%	0.0	0.3	7.4	83.0	7.9	1.2	0.1	0.0	0.0	100
2 Year Change	N	0	20	157	1397	185	39	9	1	0	1808
	%	0.0	1.1	8.7	77.3	10.2	2.2	0.5	0.1	0.0	100
3 Year Change	N	1	29	150	1178	165	48	11	0	0	1582
	%	0.1	1.8	9.5	74.5	10.4	3.0	0.7	0.0	0.0	100
4 Year Change	N	4	29	141	957	159	52	13	1	0	1356
	%	0.3	2.1	10.4	70.6	11.7	3.8	1.0	0.1	0.0	100
5 Year Change	N	4	29	114	764	158	46	11	3	1	1130
	%	0.4	2.6	10.1	67.6	14.0	4.1	1.0	0.3	0.1	100
9 Year Change	N	1	7	26	126	43	15	7	1	0	226
	%	0.4	3.1	11.5	55.8	19.0	6.6	3.1	0.4	0.0	100

Looking more deeply at the nature of changing environmental strategies in the balanced panel sample reveals that, as was true for the previous sample, the degree of change tends to be cluster within the -1 and +1 categories irrespective of which time frame is chosen. This suggests that environmental change is generally incremental, rather than radical, in character. Regarding the direction of change, it is notable that there is rather more evidence of improving environmental strategies within the balanced panel sample. For instance, 6.6% and 3.1% of firms have changed their environmental strategy by +2 and +3, respectively.

Regarding the levels of environmental strategy in this sample, Figure 33, below, provides an overview of the distribution of levels of environmental strategy for the balanced sample where, similar to the contemporaneous sample, the majority of firms in every year followed a compliance strategy (environmental strategy level = 0). Of these 1555 firm observations across all years categorised as being 'compliant', 91% neither had any strengths nor concerns. In this case, I can also now confirm that there has been a positive shift among a few isolated firms toward more positive environmental strategies as of 2004

while the percentage of firms classified as 'non-compliant' has remained relatively constant.

Figure 33: Distribution of levels of environmental strategy across different years (balanced sample)

		LEVEL OF ENVIRONMENTAL STRATEGY							
		-2	**-1**	**0**	**+1**	**+2**	**+3**	**+4**	**Total**
All years	N	82	248	1555	313	46	15	1	2260
	%	3.6	11.0	68.8	13.8	2.0	0.7	0.0	100
1997	N	7	26	154	37	2	0	0	226
	%	3.1	11.5	68.1	16.4	0.9	0.0	0.0	100
1998	N	10	19	159	36	2	0	0	226
	%	4.4	8.4	70.4	15.9	0.9	0.0	0.0	100
1999	N	6	25	160	34	1	0	0	226
	%	2.7	11.1	70.8	15.0	0.4	0.0	0.0	100
2000	N	9	25	163	27	2	0	0	226
	%	4.0	11.1	72.1	11.9	0.9	0.0	0.0	100
2001	N	11	29	161	25	0	0	0	226
	%	4.9	12.8	71.2	11.1	0.0	0.0	0.0	100
2002	N	7	22	168	27	2	0	0	226
	%	3.1	9.7	74.3	11.9	0.9	0.0	0.0	100
2003	N	6	21	169	27	3	0	0	226
	%	2.7	9.3	74.8	11.9	1.3	0.0	0.0	100
2004	N	9	31	157	24	5	0	0	226
	%	4.0	13.7	69.5	10.6	2.2	0.0	0.0	100
2005	N	7	28	133	39	11	8	0	226
	%	3.1	12.4	58.8	17.3	4.9	3.5	0.0	100
2006	N	10	22	131	37	18	7	1	226
	%	4.4	9.7	58.0	16.4	8.0	3.1	0.4	100

Methodologically, earlier studies have questioned the additivity of categories within the KLD. Reflecting this, and the desire to look more closely at the issues/areas where companies are developing their environmental issues, the next step in the analysis disaggregates the prevalence of particular areas of strength and concern among the balanced sample of companies over time. These data are presented in Figure 34, below. The average figure indicates individual strengths and concerns per firm per annum. Looking across the columns, an almost unchanging trend can be observed over the years

for the strengths, which in some categories is unexpectedly interrupted in 2005 by an over twofold increase. On the other hand the level of concerns across the balanced sample for the ten-year period appears to be more gradually increasing. The firm averages support these findings. However, it is important to draw attention to the fact that KLD added a new environmental strength in 2006 (management systems; ENV-STR-G), which had an impact on the total figure as, indeed, a great number of strengths pre-2006 seemed to have been assigned to ENV-STR-X (other strengths). Similarly, KLD added the concern 'climate change' (ENV-CON-F) to its list of indicators in 1999. What becomes apparent from the individual strengths and concerns analysis for the balanced sample is the fact that in particular strengths A (beneficial products), C (recycling), D (clean energy) and G (environmental management systems) are contributing to this comparatively more dramatic increase in environmental strengths over the last two years. On the other hand, especially concerns B (regulatory problems) and D (substantial emissions) have risen more substantially over the years compared to all other concerns and thereby help explaining the long-term gradual rise in concerns.

Figure 34: Individual environmental strengths and concerns per year (balanced sample)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
ENV-str-A	9	8	7	6	8	9	11	11	21	19
ENV-str-B	21	21	21	14	14	24	22	20	22	22
ENV-str-C	11	9	8	8	8	8	8	8	12	17
ENV-str-D	12	10	7	10	11	9	14	20	28	38
ENV-str-G	-	-	-	-	-	-	-	-	-	61
ENV-str-X	12	10	10	9	9	6	3	4	49	5
TOTAL	**65**	**58**	**53**	**47**	**50**	**56**	**58**	**63**	**132**	**162**
Average	0.2876	0.2566	0.2345	0.208	0.2212	0.2478	0.2566	0.2788	0.5841	0.7168
ENV-con-A	46	48	50	46	48	46	47	52	51	51
ENV-con-B	44	35	36	37	37	37	34	35	50	51
ENV-con-C	2	2	2	3	2	2	2	2	1	1
ENV-con-D	20	22	18	22	39	24	24	43	39	55
ENV-con-E	5	5	5	4	3	3	3	3	3	3
ENV-con-F	-	-	19	21	20	22	20	20	19	19
ENV-con-X	5	5	9	9	12	11	11	11	14	17
TOTAL	**122**	**117**	**139**	**142**	**161**	**145**	**141**	**166**	**177**	**197**
Average	0.5398	0.5177	0.615	0.6283	0.7124	0.6416	0.6239	0.7345	0.7832	0.8717

Environmental strengths: A) Beneficial Products and Services; B) Pollution prevention; C) Recycling; D) Clean Energy; G) Management Systems; X) Other Strength
Environmental concerns: A) Hazardous Waste; B) Regulatory Problems; C) Ozone Depleting Chemicals; D) Substantial Emissions; E) Agricultural Chemicals; F) Climate Change; X) Other Concern

In the next step of the analysis I sought to explore the relationship between changing environmental strategy in this period and the level of corporate environmental strategy.

For this analysis, I focus on the balanced panel of 226 companies and concentrate on the relationship between their initial levels of environmental strategy and change over a ten-year period. As Figure 35, below, indicates more than two-thirds of the firms that were classified as compliant (0) in 1997 have not changed over the nine-year period, while the other third either improved or worsened. Firms that had been classified as non-compliant (-2 and -1) made predominantly positive changes, while those that had been compliance-plus (+1) made a variety of changes. Overall, there is a strong tendency for firms towards reaching the environmental strategy of compliance and subsequently maintaining such a level.

Figure 35: Levels of environmental strategy in 1997 vs. changes over 9 years to 2006

	Level of Environmental Strategy in 1997				
Change over 9 years	**-2**	**-1**	**0**	**1**	**2**
-3				1	
-2			4	3	
-1		5	10	10	1
0		6	111	9	
+1	3	8	21	10	1
+2	2	5	5	3	
+3	1	2	3	1	
+4	1				
Total	7	26	154	37	2

The following companies were the top performers in the contemporaneous sample in terms of having the highest levels of environmental strategy in 2006 and which could all be classified as being 'leading edge': Agilent Technologies Inc. and Xerox Corporation (both +4); Applied Materials Inc., Advanced Micro Devices Inc., Baxter International Inc., Bristol-Myers Squibb Company, Dell Inc., IBM Corporation, ITT Corporation, Motorola Inc. and NIKE Inc (all +3). Within the balanced sample the following firms made the greatest improvements over the nine-year period: GM Corporation (+4); Applied Materials Inc., Xerox Corporation, AMD Inc., Kimberly-Clark Corporation, Nike Inc., Heinz (H.J.) Company, GE Company (all +3). Dominion Resources Inc. fell from +1 in 1997 to -2 in 2006. Figure 36, below, shows an exemplary selection of evolutionary profiles among several companies. As is evident from the table, some firms have a high variation in their corporate environmental strategies over time (in both directions) (for example, profiles a, c, j and p) while others manage to remain completely unchanged over the ten years

(profiles e, m, and n). Others again appear to oscillate around a certain value (firms b, d, and i), usually a level of zero.

Figure 36: Examples of evolution of corporate environmental strategy

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
1997	-2	1	2	0	0	1	0	-1	1	-1	0	1	1	-1	-1	1
1998	-2	1	2	0	0	1	0	-1	1	-2	0	1	1	-1	1	1
1999	-2	0	1	0	0	1	0	0	0	-2	0	1	1	-1	-1	1
2000	-2	0	1	-1	0	1	0	0	0	-2	0	1	1	-1	-1	1
2001	1	0	-1	0	0	1	1	0	-1	-2	0	1	1	-1	-1	1
2002	0	1	0	-1	0	0	1	-1	0	-1	-1	1	1	-1	-2	1
2003	0	1	0	1	0	0	1	-1	0	0	-1	1	1	-1	-2	1
2004	2	0	-1	0	0	0	1	-1	-1	0	-2	2	1	-1	-2	1
2005	3	1	2	1	0	3	3	-1	0	-1	-2	2	1	-1	0	3
2006	2	1	3	1	0	3	3	-2	1	-2	-2	2	1	-1	1	4

(a) General Motors; (b) Halliburton Company; (c) IBM; (d) Lockheed Martin; (e) Mattel; (f) Motorola; (g) Nike; (h) Northrop Grumman; (i) Nucor; (j) Occidental Petroleum; (k) PP&L; (l) Praxair; (m) Raytheon; (n) Union Pacific; (o) Weyerhaeuser; (p) Xerox

6.5 DISCUSSION

In light of the growing salience of environmental issues in wider society, the lack of longitudinal research on organisational responses to environmental issues, and the absence of empirical research on organisational change that distinguishes between organisational and population level influences, the research in this chapter set out to study the evolution of corporate environmental strategy in US companies over a ten-year time period. Despite growing pressure to address environmental issues, the evidence shows that changes in environmental strategy are to a great extent non-existent with firms being oriented on a compliance approach to environmental strategy. Where changes do exist I note that the pattern is prevailingly gradual with only a very small minority of companies making more rapid bursts in the form of accelerated positive changes in environmental strategy. Moreover, over the sample period, negative changes in environmental strategy are broadly as common as improvements in environmental strategy.

All in all, the 'static nature' of changes in environmental strategy seems to reflect firms' widespread inertia to adapt to the changing socio-institutional environment. This pronounced tendency towards inertia remains constant regardless of which level of environmental strategy a firm initially occupies, and is observable for all lengths of time frames and across different samples. The finding would therefore broadly corroborate Hannan and Freeman's (1984) theory of structural inertia, which holds that the speed of reorganization is much lower than the rate at which environmental conditions change.

Since changes to core features pose much greater risks in terms of reorganisation organisations are slow to adjust and hence remain stable (Levinthal 1991). These findings also give renewed weight to extant concerns about barriers to proactive environmental management (Chapter 5; Murrillo-Luna *et al.*, 2007; Post and Altman, 1994).

Yet, at the same time some firms are adjusting to their changing business environment and hence are adapting their environmental strategies. This happens in small and incremental steps, both in positive and negative directions over a long period of time. Some of the findings therefore better resonate with theories of adaptation and managerial choice (Child, 1997; Cyert and March, 1963; March, 1981; Miles *et al.*, 1978). The observation that changes are bi-directional seems to contradict common assumptions that, if firms are adjusting their environmental strategies, this could only be in form of making improvements. Given the model and the data available, I had assumed that positive changes equalise negative concerns, and therefore induce shifts towards compliance. Instead, how is it possible to explain changes in form of -1 and -2? Are they adjustments, too? In some cases they could even be labelled re-adjustments since strategies often fluctuate rather than consolidate after improvement. Frequently, there was a trend towards maintaining environmental strategy levels of compliance rather than striving for more proactive strategies in the sense that once firms had exceeded the level of compliance they subsequently reverted to this level of compliance. To that end, I concur with Lee and Rhee's (2007) findings that companies' change in their environmental strategies follows 'nonlinear paths'. Finally, with respect to reorientation and renewal I very sporadically observed the existence of major shifts, mainly over the more recent years in the areas of beneficial products and services, recycling and clean energy. However, I did not investigate the specific causes of each. Nonetheless, for the punctuated equilibrium theory to be corroborated (Gersick, 1991; Romanelli and Tushman, 1994), one would have to expect at least a levelling out of the current levels for these firms at some point in the near future.

For a rigorous analysis of the findings founded on Burgelman's (1991) induced and autonomous change processes, I note that a number of points arise that question the commensurability of the data with this theoretical background: One problem refers to the definition of what exactly major shifts are in the context of this sample. Is it any change greater than +/-2? Or is it more reasonable to consider only those strengths that contribute to a firm's overall strategy beyond the level of compliance? I had originally indicated that all other smaller changes were only peripheral adjustments that ensured compliance rather

than wholesale changes to the core of an organisation. Again how does one incorporate changes of -2 and greater into this conceptualisation? It would also be necessary to beware of the time scale of the research. While the amount of change observed could be considered comparatively negligible for the ten years of data, given that firms have been in existence for much longer this last period of ten years would represent a much more dramatic shift in strategy over the last, say, 100 years. The time-scale is thus very important when considering the occurrence and magnitude of changes.

Furthermore, in how far does the initial level of strategy play a role in determining what kind of change a firm has undergone? For instance, is inertia at compliance level different to inertia at non-compliance level? Can or should be distinguished between voluntary and involuntary inertia? In other words, what if a company cannot respond and is thus forced to maintain its status quo, whereas another firm is quite satisfied with the way things are going? The results suggest that the overwhelming majority of firms classified as being 'compliant' have neither any strengths nor concerns, which would mark them out as being 'true' to the definition of a compliance-only oriented environmental strategy. Conversely, a +2 change at non-compliance level signifies that a firm is making adjustments to become compliant while a firm at compliance level making a step of +2 would be considered a major proactive change, either reorientation or renewal. And finally, zero change may be the result of 1(2) concerns and 1(2) strengths happening concurrently, so that the overall outcome equals inertia, even though at the same time small, incremental changes (or major reorientations) in both directions are occurring.

Ultimately, the question arises does it make sense to juxtapose the theories of organisational change with the environmental strategy literature? With respect to the conceptualisation developed in Chapter 3, a firm's change behaviour – and thus its evolution – is directed toward increasing survival chances and profitability (Coleman, 1999). This *may* be achieved through an improvement in its environmental strategy. However, if a firm needs to secure its survival then a reduction in its environmental strategy may actually achieve just that. There is an implicit assumption that organisational change in the domain of environmental strategy is only goal-oriented toward socially positive outcomes, but natural environmental management is only one of many functions determining a firm's profitability/survival on the fitness landscape (Kauffman, 1995b), and its environmental strategy will (under the profit-maximisation model of the firm) be subjugated to this goal. Nonetheless, recently it would appear that it makes increasingly sense for a few firms to undertake more large-scale changes in terms of major voluntary

improvements in their environmental strategies, both by reducing concerns and by developing environmental strengths. Particularly given the changing societal and legal environment this would explain why and how these firms are trying to improve their fitness function of profitability and survival more intensively.

The results suggest two important statements: When considering the general trend towards environmental strategy levels of compliance one could argue that environmental management practices in most firms are working relatively well (enough); on the other hand, however, the majority of firms are not (yet) fully responding to the societal and institutional changes in terms of engaging in more proactive environmental management. Referring to the definition of environmental strategy (Sharma, 2000) I would argue that while firms' attitude towards compulsory aspects of reducing environmental impacts has resulted in widespread legal compliance, the voluntary side has so far only marginally been explored by a handful of firms. In reference to the analysis of the trend between 1997 and 2006 only recently (2005 onwards) have greater levels of total environmental strengths started gaining a foothold among a small selection of companies, in contrast, however, to the total levels of concerns, which have been slowly but steadily rising over the years. A possible reason for this development could be that in 2004 KLD "warned" firms that it would start including environmental management system adoptions, first as part of its 'other strengths' category (Env. Strength-X; 2005), and then subsequently introduced a whole new category in its own right (Env. Strength-G). Given the sensitivity of such information for stock markets it is conceivable that firms acted on this threat of disclosure and, a) either certified already existing EMSs, or b) started implementation altogether. In absence of detailed background information about the levels of communication between KLD and S&P500 firms, however, such an interpretation can only be purely speculative. Often higher levels of strengths are correlated to higher levels of concerns, which begs the question in how far are firms trying to compensate for higher levels of concerns through higher levels of strengths?

Given that the distribution of changes across all years is roughly equal for both contemporaneous and balanced sample, it could be argued that these changes have no correlation with whether firms have been consistently part of the S&P500 or not. In other words, firms that were continuously members of the S&P500 and which, one could claim, must therefore have been commercially more successful, have not, relatively speaking, behaved any differently in comparison to the varying total population of firms that constituted the S&P500 at any one time.

In terms of further research opportunities especially one question merits attention in the future: What has caused the recent increase in environmental strengths? While the mostly 'static evolution' of environmental strengths has been witnessed, there are signs to suggest that very sporadically firms have realised the potential of voluntary environmental responses (beneficial products, recycling and clean energy). Have firms reached a certain tipping point in their stance towards environmental strengths in 2005? What is driving them? Internal or external constituents? Are they economically minded, stakeholder-oriented, or based on (slack) resources and differentiated capabilities? The following Chapter 7 will attempt to tease out these individual motivations to better understand what is driving 'voluntary' responses to environmental issues.

6.6 CONCLUSION

The findings are interesting in that they portray the evolution of corporate environmental strategy in a light that may for some appear to be disappointing. Still, given the overall tendencies towards environmental strategy levels of compliance one could argue that environmental regulations are working and should be applied more widely. The question is thus are more and tighter environmental regulations the only way forward? With such a broad question the solution for government policy will lie in the type of environmental issue at stake and the form of responses required. Problems of global reach and scale such as climate change and ozone depletion are unlikely to be easily 'regulated away' unless they are enacted through international frameworks. Policy-makers should also be aware of the fact that businesses are able to and do change their environmental strategies (whether voluntarily or not) in both environmentally positive and negative directions. The specifics of the respective industry sectors will undoubtedly play a major component in such responses, but legislators are probably best advised to set environmental minimum standards depending on the issue in order to achieve uniform levels of compliance across an industry. Crucially, however, these standards need to take into account business growth in the form of relative rather than absolute performance levels. And while environmental regulations seem to be a potent policy tool they are not without disadvantages and must be considered wisely. Especially in a competitive global business environment offering the right levels of economic incentives in form of loans, tax relief, and opportunities for emissions trading may lead to better and more proactive results. Business practitioners for their part must start to see the bigger picture and the risks at stake, and embark on business plans and visions that equally comprise of voluntary environmental management responses

beyond compliance as there is little evidence to suggest that concerns about the environment are going to vanish.

As the research was grounded in the induced and autonomous strategy processes perspective (Burgelman, 1991) and thus sought to integrate sometimes very opposing theories, I find that indeed different types of change behaviour are observable. I therefore appreciate Dooley's (1997), Kelly and Amburgey's (1991), Levinthal's (1991), and Stacey's (1995) efforts to consolidate these perspectives into a more context-dependent view, which emphasises the interrelated nature of different change patterns. However, I also concede that theories of organisational change have to be treated with the necessary caveats in the context of environmental strategy since, despite calls for greater 'mainstreaming', environmental issues often only play a subordinated role in a firm's overall behaviour.

6.7 CHAPTER SUMMARY

Anecdotal evidence seems to suggest that firms are responding differently to the mounting concerns over environmental degradation and climate change. While a few studies at individual firm level do exist, relatively little is known about the longitudinal development of corporate environmental strategy at the population level of firms. By employing KLD data Chapter 6 has explored the evolution of environmental strategy among a sample of S&P500 corporations over the period 1997 to 2006. The findings suggest widespread inertia among firms to adjust to the changing socio-institutional environment. By contrast, most changes in environmental strategy appear to be small and incremental with only a few firms taking slightly bigger steps recently.

CHAPTER 7: OIL PRICES AND GREENING –

ANTECEDENTS OF EVOLVING CORPORATE ENVIRONMENTAL STRATEGY IN THE UNITED STATES

7.1 INTRODUCTION

Chapter 7 contributes to the development of research on environmental strategy and organisational change by addressing a variety of concerns attached to earlier research as already discussed in Chapter 6. Specifically, it explores the effects of several firm, industry and economy-wide factors in stimulating changes in corporate environmental strategies among a sample of large U.S companies drawn from a variety of industry sectors over the time period 1991-2006. In so doing, it complements earlier research that has focused on firm and industry-level factors by providing an analysis of the relevance of field-level factors, such as the levels of oil price and interest rates on evolving patterns of corporate responses to environmental issues.

This chapter makes three substantive contributions. First, it conducts the first systematic longitudinal analysis of organisational change in the context of environmental strategy. Because of the panel data character of the sample and its broad industry coverage, the analysis is able to examine the degree to which different causes have led to change in environmental strategies at population level over time. By examining why companies across a variety of industries may be changing their responses to environmental concerns over time, the aim is to shed light on significant debates surrounding the drafting of effective environmental policy solutions.

Second, although there exists a plethora of finance and economics literature that investigates the wider impact of changes in levels of oil price and interest rates on macro-economic indicators, such as, for example, monetary policies and economic downturns (Leduc and Sill 2004), real exchange rates (Bénassy-Quéré *et al.*, 2007), stock markets (Park and Ratti, 2008) and GDP (di Giovanni and Shambaugh, 2008), to date very little research has been conducted with the aim to test their direct effects on firm-level behaviour (Sadorsky, 2008). Thus, by including a range of macro-economic variables in the analysis it extends existing empirical knowledge by studying their influence on corporate strategy and organisational change.

Third, I contribute to the ongoing conversations in the conceptual literatures concerning the nature of change processes. By grounding the framework in the literatures of complexity and organisational change as well as extant research in environmental management and corporate strategy I acknowledge the recognition that any strategy is not a static but a dynamic process, which continuously shapes the organisation and which is

affected by a multitude of factors and actors (Bartlett and Goshal, 1991; Stacey, 1995). Drawing on the concept of 'rugged fitness landscapes' I try to explain how both adaptation and selection forces shape corporate environmental strategy and I thereby extend theory regarding firms' ability to find solutions to complex, strategic problems. To summarise, Chapter 7 has the following three aims:

- To study the effect of field-level and macro-level factors on the evolution of corporate environmental strategy;
- To establish whether certain epochs are of significance in this evolution;
- To test whether the conceptualisation developed in Chapter 3 has predictive validity.

The remainder of this chapter is structured as follows. The next section revisits the conceptualisation from Chapter 3 followed by an application to the field of environmental strategy and the development of the research hypotheses. Subsequently, I present the results before concluding this paper with a discussion of the findings.

7.2 COMPLEXITY, FITNESS AND EVOLVING ENVIRONMENTAL STRATEGY

This section first reviews parts of the existing literature on environmental strategy before reiterating the conceptual approach and developing the research hypotheses. Generally-speaking, there is a tendency for existing research to explain firms' environmental responsiveness either by reference to firm level factors, such as company size, profits and other internal resources and capacities (Clemens, 2006; Delmas and Toffel, 2008; Halme, 2002; Judge and Douglas, 1998; Rothenberg, 2003), or industry level factors, such as regulation and other stakeholder pressures (Buysse and Verbeke, 2003; Child and Tsai, 2005; Fineman and Clarke, 1996; Jiang and Bansal, 2003; Murrillo-Luna *et al.*, 2007; Rugman and Verbeke, 1998a, 1998b; Schaefer**,** 2007; Sharma and Henriques, 2005). Research on the significance of macro-economic factors and their potential influence on companies' environmental responsiveness, however, is largely missing.

Reflecting the orientation of the empirical literatures, conceptualisations of corporate environmental responsiveness have drawn predominantly on institutional and resource dependence theories, and the resource-based view of the firm. For instance, McKay (2001) asserted that 'organizations do not respond to a regulatory pressure in isolation, but rather in concert with, and in reaction to, the response of other relevant stakeholders and pressures within the environment' (McKay, 2001: 625). Combining institutional theory

with the resource-based view of the firm, Bansal (2005) and Lee and Rhee (2007) sought to develop a more firm-specific understanding of time-related change effects in environmental strategies and sustainable development by combining internal firm resources with firms seeking social approval. They argue that, while institutional change occurs mostly at field-level, the resource-based arguments influence changes at firm level and emphasise the significance of different eras or time periods at field level for firm environmental responsiveness. Further research at the firm level by Winn and Angell (2000) suggests that a firm's approach to implementation and its policy commitment are independent from one another and that, over time, there may be several different scenarios, or path changes, in corporate environmental management depending on a firm's greening profile. In essence, the extant literature is characterised both by the paucity of longitudinally oriented work, and by a neglect to study the importance of field-level factors on changes in environmental strategy.

7.2.1 THEORETICAL BACKGROUND

Consistent with the conceptualisation of the evolution of corporate environmental strategy in Chapter 3, this Chapter builds on the organisational metaphor of organisations navigating across a changing 'rugged fitness landscapes' in search of peaks in their fitness. Chapter 3 argued that the 'simple rule' behind this search is agents' desire to satisfice their local and global fitness. While local (in other words, individual) fitness is a much more complex construct, global fitness within a commercial organisation has been assumed to consist of a combination of ensuring organisational survival and making a profit. Despite their individual differences, agents, collectively, are trying to adapt to the changing fitness landscape in order to guarantee profit and survival even if this behaviour may be differently enacted at an agent's individual or group level (Levinthal and Warglien, 1999).

The fitness landscape of an organisation is a function of several determinants of which responses to environmental issues are only one out of many factors. More specifically, a variety of economic and institutional variables all shape an organisation's particular fitness landscape within which it is trying to find the optimum strategy configuration in order to satifice its fitness. Thus, an organisation's external fitness landscape is the ultimate selection mechanism of its internal fitness and hence determines profit and survival chances.

Furthermore, the thesis is built upon the understanding that corporate strategy is an emergent phenomenon in the form of organisational behaviour (See the organising framework in Chapter 3; Hamel, 1998; Mintzberg, 1994; Stacey, 1995). As such, this chapter is concerned with the aggregate effects of observable organisational behaviour in terms of corporate environmental strategy as opposed to mere rhetoric and policy (Rhee and Lee, 2003; Winn and Angell, 2000).

7.2.2 DEVELOPMENT OF HYPOTHESES

Based on the organising framework and the conceptualisation from Chapter 3, this section develops several specific hypotheses in the context of firms' environmental responses. These hypotheses address the causes of why firms change their environmental strategies over time. Consistent with Sharma's (2000) definition a firm's environmental strategy can be regarded as adaptive organisational behaviour in response to environmental issues shaping the fitness landscape in both positive and negative ways. This view does not preclude the possibility that an organisation can make significantly proactive steps in its environmental strategy if it perceives of such actions as having the chance of maximising its fitness in the given (or a future) fitness landscape. On the other hand, it acknowledges the growing recognition that more proactive environmental strategies may not be beneficial or possible for all companies in all circumstances (Aragón-Correa and Rubio-López, 2007; Christmann, 2000; Orsato, 2006; Shelton, 1994; Shelton and Shopley, 1996), as well as the possibility that firms' environmental responsiveness can fluctuate over time by getting both better *and* worse. Essentially, an environmental strategy is only one of many coupled determinants of the overall fitness function of the firm, and other factors may override or reverse the environmental strategy in order to increase profit and guarantee survival.

In accordance with this view, changes in the topography of the fitness landscape are a major driver of organisational change. More specifically, where the fitness landscape changes, so that the payoffs to particular strategic configurations increase (for instance, from materials recycling, exploring new markets of environmentally beneficial products and services, incurring reduced levels of fines, various organisational benefits from implementing an environmental management system, reputational and commercial benefits from proactively engaging with climate change), there are likely going to be relatively more improvements across the population of organisations.

One such factor that has a population wide impact is increasing oil prices. Especially firms in a variety of engineering, manufacturing, chemicals, transport, and logistics industries will then need to rethink their energy strategy because of the high direct and indirect operating costs involved. First, firms may have to consider their long-term options in terms of sourcing their oil supplies if they require this directly as a raw material input for their operations. Second, the indirect costs involved with high prices of oil affect decisions about investments into plant and equipment technologies that rely on oil as a source of energy. Third, high oil prices may incentivise them to search for and develop new opportunities for alternative and more energy efficient products and services (for example, solar cells, hydrogen cars, carbon emissions trading), or at least these circumstances make it financially more viable to be involved in such technologies or services. In effect, the dependence on oil leads to a situation in which the fitness landscapes of firms across a population are directly and significantly shaped by trends in oil prices. Therefore, firms will improve their environmental strategies over time, for example by taking a variety of actions aimed at improving energy efficiency or through the introduction of environmentally efficient products and services, if the payoffs due to a changing fitness landscape as a result of higher oil prices make such changes profitable and/or necessary for survival.

> ***Hypothesis 1:*** Higher oil prices are associated with positive changes in corporate environmental strategy.

Similarly, in a commercial environment characterised by a changing fitness landscape credit availability may affect firms' environmental responsiveness. If interest rates are low, and hence greater and cheaper opportunities for borrowing capital exist, firms may decide to use this financial situation to invest in new, energy-efficient technology, implement environmentally friendly management systems, or develop their own environmentally beneficial products and services. In this case, interest rates act as catalysts for organisational change that is evoked by changes in the fitness landscape. Therefore, over time, firms will improve their environmental strategies if the payoffs due to a changing fitness landscape as a result of lower interest rates make such changes profitable and/or necessary for survival.

> ***Hypothesis 2:*** Lower interest rates are associated with positive changes in corporate environmental strategy.

In the existing literature, stakeholder theory has chiefly been applied to explain companies' behaviour as a result of pressures exerted by stakeholders in form of employees, supplies, NGOs, customers, and others. One group of stakeholders are the shareholders; and large, institutional investors in particular. The general growth of socially responsible investments (Social Investment Forum, 2006) over the last ten years has resulted in large-scale changes to the way in which institutional investors manage their enormous financial assets. Specifically, institutional investors have slowly begun to organise themselves (for instance, Interfaith Center on Corporate Responsibility, Investor Responsibility Research Center, Investor Network on Climate Risk) in order to engage in dialogue with companies' directors and, if necessary, to file social, environmental and governance shareholder resolutions with the aim of influencing corporate strategy and policies (David *et al.*, 2007; O'Rourke, 2003; Sparkes and Cowton, 2004). Rehbein *et al.* (2004) showed that shareholder activists target large companies and industries with poor environmental performance in their environmental resolutions. In the US alone, the total number of resolutions filed rose from 299 in 2003 to 348 in 2005 (Social Investment Forum, 2006) and by virtue of their financial position and power institutional blockholders can effectively control a firm's resource flow through their large percentage of equity investments (Johnson and Greening, 1999). The size of institutional investors and their determination to influence firms by filing resolutions should thus affect firms' corporate environmental strategy.

Recent preliminary findings from Reid and Toffel (2008) have suggested that firms do respond to shareholder resolutions with respect to signing up to the Carbon Disclosure Project, and that this effect held for both direct and indirect spill-over effects at industry level. However, there is reason to doubt that such corporate social responses are anything more than 'window dressing' to appease activist shareholders (David *et al.*, 2007). Nevertheless, in this context, shareholder resolutions act as an indicator, or perhaps more succinctly as a warning sign, of socio-institutional changes. Rather than having a direct impact on a firm's fitness landscape, they signal that wider institutional changes are taking place, which may subsequently have the potential to threaten organisational fitness (Den Hond and de Bakker, 2007; Reid and Toffel, 2008). The impact on organisational fitness in this regard relates to the long-term survival chances given impending threats from regulation, changing customer trends or heightened media exposure. Therefore, over time, firms will improve their environmental strategies if the payoffs due to a changing fitness landscape as suggested by growing numbers of shareholders' environmental resolutions make such changes profitable and/or necessary for survival.

Hypothesis 3: Firms with greater numbers of environmental shareholder resolutions are associated with positive changes in corporate environmental strategy.

An alternative explanation for why organisations change their environmental strategy over time ties in with the wider changes of the fitness landscape described above, but extends this view to a firm's internal processes of strategic choice and adaptation (Cyert and March, 1963; Child, 1997). This perspective argues that firms' top management decide the extent to which they can determine organizational structures and processes necessary for dealing with the 'three broad problems' as opposed to letting conditions in the business environment dictate them (Miles *et al.*, 1978). In particular, the administrative problem requires management to reduce uncertainty about current structures and processes without at the same time constraining any potential future activities. As Miles *et al.* (1978) note, 'the administrative system must facilitate the organization's future capacity to adapt by articulating and reinforcing the paths along which innovative activity can proceed' (Miles *et al.*, 1978: 548). This dilemma was characterised as the trade-off between exploitation and exploration (March, 1991) and many firms hope to overcome it by allocating financial and human resources to the research and development function (R&D). Those firms that routinely spend large amounts on their research and development may have already changed their staff's mental mode to being able to critically review the organisation's products, structures and processes and may have built capabilities that could facilitate the implementation and improvement of environmental management (Aragón-Correa, 1998; Christmann, 2000; Sharma and Vredenburg, 1998). By increasing the R&D function organizations develop more experimental leverage with respect to environmental proactiveness and can hence display greater risk-taking characteristics. In fact, some studies have suggested that R&D activities are positively related to improved environmental performance in terms of introducing beneficial products and processes (Khanna and Anton, 2002; King and Lenox, 2002). In particular, firms can invest in environmental manufacturing and new product development (Hart and Milstein, 1999; Newman and Hanna, 1996) with the aim to develop and implement new environmentally friendly products, processes and services. In other words, firms engage in voluntary search activities designed to improve their organisational fitness. By devoting their attention to products and services that may better reflect the changing market threats and opportunities they hope to adapt to the business environment and find solutions that will ensure future profits and survival. Thus, over time firms change their environmental strategies due to

strategic renewal resulting from internal search and selection processes within the R&D function (Burgelman, 1991).

> ***Hypothesis 4:*** Firms with comparatively higher levels of R&D expenditures are associated with positive changes in corporate environmental strategy.

To summarise, changes in corporate environmental strategy can thus be construed as responses to changes in the overall fitness landscape. This requires the organisation to make adjustments in all the constituent parts of its corporate strategy of which its environmental strategy represents only one of many interrelated constituents.

7.3 METHODS

For the analysis of antecedents to changes in corporate environmental strategy, I again used the KLD STATS database, this time for the extended period of the years 1991 to 2006. In total, I examined 7418 firm-year observations from 858 different companies across the 15 years under investigation.

7.3.1 DEPENDENT VARIABLE

In order to investigate the long-term trends of corporate environmental strategy, I used the computations of the dependent variable employed in Study 1. The aim was to analyse changes in a company's environmental strategy for increases or falls in the total levels of environmental strategy over one, two, three, four, and five years time of data observations. However, given the non-normal distribution of the resulting variable 'CHLEVENVSTRAT' and the fact that descriptive statistics of the raw data suggested that an overwhelmingly large percentage of those changes (84% over one year) amounted to zero, I conducted a simple data manipulation to circumvent this problem. The solution was to recode and broadly summarise the data into three sub-groups of change variables depending on whether a firm had worsened its performance (0), stayed the same (1), or improved (2) over 1, 2, … 5 years resulting in an ordinal ranking for the new dependent variables (DEP1; DEP2; …DEP5). This also had the effect that the new dependent variable of the measure of change in corporate environmental strategy now reflected a wide-ranging directional classification of change rather than incremental amounts of change, because the theoretical background of this study is focused only on the direction of changes rather than a specific magnitude (see also Shropshire and Hillman, 2007, for comparison).

The following summarises the steps of computing the new dependent variables:

a) $LEVENVSTRAT_{(t)}$ = Environmental strengths ($A_{(t)}+B_{(t)}+C_{(t)}+D_{(t)}+G_{(t)}+X_{(t)}$) – Environmental concerns ($B_{(t)}+D_{(t)}$)
b) CHLEVENVSTRAT1 = $LEVENVSTRAT_{(t)}$ – $LEVENVSTRAT_{(t-1)}$
   Repeat for changes over 2, 3, 4 and 5 years, i.e., CHLEVENVSTRAT2 etc.
c) Recode CHLEVENVSTRAT1 into DEP1:
   If CHLEVENVSTRAT1 < 0, then DEP1 = 0
   If CHLEVENVSTRAT1 = 0, then DEP1 = 1
   If CHLEVENVSTRAT1 > 0, then DEP1 = 2
   Repeat for changes over 2, 3, 4 and 5 years, i.e., DEP2 etc.

7.3.2 INDEPENDENT VARIABLES

As part of this research, the aim was to test the effects of two field-level and two macro-level factors on initiating organisational change with respect to environmental strategy. To that end, two macro-economic factors and two firm-specific factors were chosen as outlined below for the key independent variables in order to explain in how far they have an impact on firms' fitness landscapes.

Field-level factors. I retrieved average annual federal funds interest rates for the years 1991 to 2006 from the website of the Board of Governors of the Federal Funds Reserve (Federal Funds Reserve, 2008) and created five-year lagged variables for each firm under observation (LAGINT1…). Similarly, average annual inflation adjusted WTI Crude Oil prices were incorporated into the database (WTI, 2008) and again lagged over five years (LAGOIL1…).

Macro-level factors. I obtained a list of shareholder resolutions from the Interfaith Center for Corporate Responsibility (ICCR) in the US. A variable was then entered indicating the number of environmental resolutions that were filed in a particular year (NUMRES) for a particular firm and subsequently lagged variables were computed for these variables as well (LAGNRES1…). Drawing on a number of financial statistics from *DataStream* for each company-year, I calculated R&D intensity by dividing R&D expenditure by total assets times 100 (RDAS) and computed lagged variables (LAGRDAS1…).

7.3.3 CONTROL VARIABLES

I controlled for firm size by taking the natural logarithm of total assets (SIZE) and created lagged variables over five years (LAGSIZE1…). Furthermore, for profitability I divided profits by total assets times 100 in order to arrive at a firm's return on total assets (ROTA), and for leverage (LEVERAGE), I divided a firm's long-term debt by its total assets times 100. Again for both variables I created five-year lag variables as well (LAGROTA1… and LAGLEV1…).

Additionally, I created industry sector dummy variables in order to capture and control for industry sector specific variation. These industry dummies were based on two-digit SIC codes. In various instances sectors were grouped together in order to achieve relative comparability in terms of number of firms within a single sector. The groupings reflect similar industry sectors as well as environmental sensitivity and energy-intensity. The results of the industry dummies are, however, omitted for reasons of space and clarity. As could reasonably be expected, industry sector variation contributed to the models to varying extents. I omitted year-dummy control variables in the analysis as pilot tests suggested that multi-collinearity was a problem due to the inclusion of year-specific oil prices and interest rates.

7.3.4 RESEARCH APPROACH

For the longitudinal research approach I used SPSS 15.0 and LIMDEP packages to better understand the evolution of corporate environmental strategy. Specifically, I applied an 'Ordered Probit' estimation approach, which recognises the ordinal nature of the dependent variable without assuming that the differences between one category and the next are of uniform size across the variable's entire range (Brammer and Pavelin, 2006; Greene, 1993). The ordered probit model assumes that the observed indicator of changes in corporate environmental strategy (DEP1, DEP2, etc.) is an observable indicator of a latent and unobserved phenomenon (in this case, the changes in corporate environmental strategy over different time periods) that has ordinal values. Based upon the earlier conceptual discussions a full model was estimated as described below:

$$DEP1 = f(X, I) \quad (1)$$

$$X = \{LAGINT1, LAGOIL1, LAGNRES1, LAGRDAS1\}$$

$$I = \{LAGSIZE1, LAGROTA1, LAGLEV1\}$$

where

DEP1 = an ordinal dependent variable taking the value 0 if a firm changed its level of environmental strategy in negative direction over a one-year period, taking the value 1 if a firm did not change its level of environmental strategy over a one-year period, and taking the value 2 if a firm changed its level of environmental strategy in positive direction over a one-year period;

LAGINT1 = the level of average federal funds interest rates in the previous year;

LAGOIL1 = the inflation adjusted average level of WTI crude oil prices in the previous year;

LAGNRES1 = the number of environmental shareholder resolutions filed against this firm in the previous year;

LAGRDAS1 = the ratio of R&D expenditure to total assets in the previous year;

LAGSIZE1 = the natural logarithm of firm total assets in the previous year;

LAGROTA1= the ratio of pre-tax profits before interests to total assets in the previous year;

LAGLEV1 = the ratio of firm total debt to total assets in the previous year.

For all models the specification followed a 'same-lag' structure in the sense that in each case the lags of the independent variables mirrored those of the dependent variable. In other words, when the dependent variable covered changes in environmental strategy, for example, over three years (DEP3), then all independent variables were specified in the model with the same lag of three years (LAGINT3, LAGOIL3, etc.), and equally for all other combinations.

7.4 FINDINGS

This section presents the findings from the research into evolving corporate environmental strategy. I begin the analysis by discussing the results of estimating the empirical model on all data available. These data relate to the full set of variables from all years and companies within the S&P500 as provided by KLD. Figure 37, at the end of this chapter, affords an overview of the means, standard deviations, and correlations for the dependent and independent variables.

One of the key findings from the descriptive statistics (Figure 37) – and consistent with Chapter 6 – is that the means of the dependent variables of the sample are close to 'one' across all five different time periods (DEP1 to DEP5). Since I recoded the dependent variables so that whenever a firm did not change its environmental strategy over various

time periods it would be classified as 'one', the descriptive results seem to indicate that most firms have not changed their environmental strategy across the years. This is, in itself, a significant finding, as it would appear to contradict empirical findings that suggested (albeit in different contexts) that over time firms do positively change their environmental responsiveness (Bansal, 2005; Lee and Rhee, 2007) As the recoding from CHLEVENVSTRAT1 to DEP1 did not affect the number of firms with no change, it is no surprise then that as much as 84.4% of the valid sample have not changed their level of environmental strategy over one year to another. This percentage naturally decreases when the period of change is increased as the sample gets smaller; but even over a five-year period still 68.2% of the valid observations have not changed. At the most basic level, this observation suggests that the majority of firms have displayed relative inertia in terms of their environmental responsiveness.

With this research, therefore, the aim is to explain to what extent the change that has occurred across the population is attributable to changes in firms' fitness landscape, to what extent this change is dependent on certain time periods, and whether there is a difference between firms that have been consistently present over the fifteen years of observation and those that have not. Figure 38, at the end of the chapter, provides the results of the regression analyses for the full sample with increasing lag specification (Models 1 to 5). The findings suggest that of the independent variables only interest rates and oil prices are highly significantly responsible for changes in environmental strategy. In all models, there is a negative and significant relationship between interest rates and changes in environmental strategy at the 95% confidence level or higher. Oil prices positively and significantly ($p<0.01$) predict the dependent variables over two and five year lags. Neither R&D intensity nor the number of environmental shareholder resolutions appears to play an important role in shaping change in environmental strategy. Of the control variables, firm size is positively and significantly related to environmental strategy ($p>0.05$), while occasionally leverage is negatively and significantly (at least $p>0.1$) associated over two, three and four years. This suggests that larger firms with less debt might be more likely to respond to environmental issues.

Bearing these findings in mind, the next step was to analyse in how far the independent variables had a varying effect within different eras. Given the increasing salience of environmental issues both in the public and corporate domains, I sought to test whether this phenomenon had any impact on the model. To that end, I subdivided the data into three equal time periods, 1991 to 1996, 1997 to 2001, and 2002 to 2006 (Figure 39, at the

end of this chapter). Models 6 to 14 report the findings from three distinctive time periods between 1991 and 2006 each using increasing lag models of up to three years. Three key findings are worth highlighting. First, again neither R&D intensity nor shareholder resolutions have any statistical impact on the model predictions regardless of which time frame is chosen. This suggests that these firm-level factors do not explain why firms would change their environmental strategies over time. Second, for interest rates the results suggest that, when they are at their most significant ($p<0.01$), a negative relationship exists throughout all three different time periods. Finally, oil prices on the other hand vary in their direction of influence, with associations being negative ($p<0.01$) for the early period, no relationship for the middle period, and positive for the late period ($p<0.01$). The results from the control variables size and leverage again seem to broadly resonate with findings of the full period sample from before (Figure 38, at the end of the chapter), the only difference being that these findings are insignificant for the middle period. Broadly speaking, the results seem to imply that oil prices had a much bigger and positive effect in recent years on changes in environmental strategy, while interest rates were negatively associated with the dependent variables throughout the whole sample period.

In order to isolate the effect on environmental strategy of these population-level influences from the changing behaviour of individual companies, in the final part of the analysis I only included firms that were consistently present in the sample for the entire sample period 1991 – 2006 (Figure 40, at the end of this chapter) – the 'balanced panel sample' as described in Chapter 4. As it would appear (models 15 to 19), for firms that were present in the S&P500 sample for the full 15 years, levels of oil prices positively and highly significantly ($p<0.05$ or better) predicted changes in levels of corporate environmental strategy over all lags except the four year lag (model 18). Interest rates were significantly ($p<0.01$) and negatively associated with changes in environmental strategy, at least over three and more year lags. Rather more unexpectedly, the number of environmental shareholder resolutions also appears to predict changes in the dependent variable in a negative and significant way over five years with 95% confidence. And while leverage disappears as a significant contributor to the models, size remains positively and highly significantly ($p<0.01$) associated with changes in environmental strategy.

Given the preceding analyses, the following statements with respect to the four hypotheses can be made: I accept hypothesis 1 that, across a population of firms, higher oil prices are associated with positive changes in corporate environmental strategy; however, I would

stress that the acceptance of this hypothesis is conditional upon the findings of the selected time period sample (Figure 39). I will discuss the caveats relating to the acceptance of hypothesis 1 in the following section. Hypothesis 2 predicted that, across a population of firms, lower interest rates are associated with positive changes in corporate environmental strategy. Based on the results I accept this hypothesis. Hypotheses 3 and 4 predicted that, across a population of firms, greater numbers of environmental shareholder resolutions and higher levels of R&D intensity, respectively, are associated with positive changes in corporate environmental strategy. I cannot find results in support of these statements and hence fully reject hypotheses 3 and 4.

7.5 DISCUSSION

This chapter set out to study the evolution of corporate environmental strategy in US companies over a time frame of 15 years and framed the research in the complexity model of firms navigating rugged fitness landscapes. Consistent with the findings of Chapter 6, the findings of this Chapter 7 highlight that, despite increased public interest in and pressures for greater environmental sensitivity, changes in environmental strategy are surprisingly rare. Moreover, where they do exist, they appear to be a relatively recent phenomenon. This suggests that for a long time firms found the best contribution of their environmental strategies to their overall firm's fitness, and that only recently due to changes in the fitness landscape, firms made adjustments in their environmental responsiveness. With respect to the hypotheses, I find that macro-economic factors are significantly associated with these changes in environmental strategy. Specifically, both inflation adjusted oil prices and federal funds interest rates appear to have an impact on firms' environmental strategies across S&P 500 firms over time. As correctly predicted, higher oil prices are associated with positive changes in environmental strategy among the population of firms, as are lower interest rates. By contrast, neither firms' R&D intensity nor their number of environmental shareholder proposals seems to have an effect on firms' environmental strategy. These findings thus raise a number of issues.

Oil price and interest rate trends appear to be important drivers for changes in corporate environmental strategy at the population level. These macro-economic field factors reflect the nature of business and its ubiquitous dependence on the key resources, such as raw materials and capital, for adjusting their environmental responsiveness. However, particularly for oil prices, I have noted that such trends were dependent on different time periods (Figure 39). A closer look at the levels of oil prices reveals that these had

historically been relatively low in the early period, they then followed a period of uncertainty in the middle, only to rise far more dramatically over the recent years of the data sample. The question is thus did oil prices only start to matter recently after exceeding a certain threshold or tipping point in price? The results therefore confirm Lee and Rhee's (2007) findings of the significance of certain eras in having a particular impact on firms' environmental strategy behaviour. Yet, at the same time, interest rates had a consistent impact on the dependent variable across all fifteen years under observation, perhaps indicating the continuing economic significance of access to low-cost capital for investment in environmental projects. This raises questions about firms' long-term planning behaviour, for example, in how far do firms anticipate oil prices to increase or decrease in future and thus will they change their strategies accordingly? And given the very recent return to much lower levels, how will firms respond to them, while interest rates are equally low? Were these first-mover advantage strategies banking on generally rising oil prices in the future? Who decides such responses within the companies?

With respect to the analysis of the hypothesis of shareholder resolutions initiating significant proactive environmental strategy change I find no evidence of such an effect. One reason for that may be the fact that institutional shareholders have only recently started to organise themselves properly and collaborate on the filing of such resolutions. The rising numbers of resolutions filed are testament to that. Resolutions are also only targeted at very specific firms (usually the worst ones in terms of environmental performance), which would suggest that their effect had neither any direct nor 'spill-over' effects for broader environmental strategy at the population level so far. Additionally, the content of their resolutions has again only lately started to address operational and strategic issues, such as climate change, whereas in the past they predominantly used to focus on reporting, disclosure and labelling. This shift may have impacts on firms' behaviour, which would only become evident in the future. So far, however, environmental shareholder resolutions have not resembled exogenous shocks large enough for firms to consider the need to make far-reaching changes in their environmental strategy and thus to initiate reorientations. In a similar vein, research and development equally had no effect on firms' change in environmental strategy. This may be a result of data levels not changing enough across time, or because the R&D function within S&P firms reflects long-term commitments and is thus 'business-as-usual' without sudden great changes in expenditure that would be picked up in the regression analysis. Based on the results, however, I cannot find statistical evidence for the hypothesis that greater levels of R&D expenditure are directly associated with positive changes in environmental strategy.

Finally, and consistent with Kelly and Amburgey's findings (1991), I notice that bigger firms are more likely to change and hence tend to be more proactive in their environmental strategies, possibly as a result of their visibility, reputation, brand, image, and slack resources, to mention but a few (Bansal, 2005). The observations thus do not corroborate the theory that the likelihood of inertia increases with size (Hannan and Freeman, 1984; Miller and Chen, 1994).

The theoretical framework of firms navigating their respective fitness landscapes has allowed a more universal conceptualisation of how and why changes in environmental strategy might occur. I find that, unlike macro-level factors R&D intensity and shareholder resolutions, the field-level effects of varying oil prices and interest rates appear to have a direct impact on firms' fitness landscapes, and thus their adaptive change behaviour. It is probably important to re-iterate that due to the constantly moving fitness landscape, it becomes difficult to predict changes in environmental strategy for a particular firm since other factors will doubtlessly play a role, too in determining the required adaptations. However, in light of the fact that both profit and survival are important drivers of changes in organisational strategy, I find evidence that oil prices and interest rates are key factors in shaping such a fitness landscape. In reality, a much greater combination of factors (including societal trends and regulation) will have an impact on firms' behaviour at different points in time. This would also resonate with Bansal's (2005) findings of the importance of the media, stakeholders and regulation in causing organisations to change and that the combination of causes varies over time. Firms must therefore find solutions to a variety of fitness problems of which their environmental strategy – linked with other functional strategies – contributes to this overall fitness function.

For policy makers, the findings highlight the significance of oil prices and interest rates, and thus firms' responsiveness to economic incentives, on corporate environmental behaviour. While there are therefore obvious reasons for why higher oil prices might generally be desirable from a societal point of view with respect to firms' environmental proactiveness, they are equally harmful from a wider economic perspective. Policy makers therefore ought to spend even more effort on improving economic incentives in form of loans, tax relief and other subsidies for environmental innovations, as well as greater opportunities for emissions trading schemes. Practitioners for their part are advised to rethink their wider business strategies in light of the conceptual framework and findings.

7.6 CONCLUSION

This chapter has highlighted the importance of macro-economic influences on the evolution of corporate environmental strategy. The research was grounded in the complexity theory and as such sought to understand firms' change behaviour with respect to environmental strategy as a result of an evolutionary process designed to safeguard profit and survival. I believe that the research has emphasised the (perhaps disappointingly) self-interested nature of organisations to adjust to their changing business conditions in order to withstand the strong selection forces at play. At the same time, it has demonstrated that positive steps are indeed possible given the right economic incentives and drivers. From a research perspective, it will be interesting to see how these trends will develop in the upcoming times of recession coupled with currently very low oil prices and falling interest rates. Are firms going to reverse any environmental efforts they have already made? Are other factors of equal significance? For instance, how are the new governmental administration and the statements made during the recent Copenhagen 2009 conference going to affect businesses' behaviour?

7.7 CHAPTER SUMMARY

This chapter has investigated the evolution of corporate environmental strategy among S&P500 firms over a 15-year period. Drawing on complexity theory it developed a framework of changes in corporate environmental strategy based on the concept of 'rugged fitness landscapes' within which firms attempt to adapt to the changing environment by making decisions that improve their competitive fitness. The results suggest that, while higher R&D intensity and environmental shareholder resolutions had no effect, the field-level factors oil prices and interest rates play a significant role in influencing companies' environmental strategies over time by impacting their ability to make a profit and survive. For oil prices this association strengthened once they reached significantly higher levels than usual, in this case, when the oil price reached record levels in 2005 and 2006. The findings highlight the complex interaction between firms' corporate strategy and their functional (including environmental) strategies, and suggest that firms are trying to satisfice their organisational fitness by responding to environmental issues.

Figure 37: Descriptive statistics and the Pearson correlation matrix derived from the sample

	Mean	Std. Dev.	DEP1	DEP2	DEP3	DEP4	DEP5	LAGSIZE1	LAGLEV1	LAGROTA1	LAGRDAS1	LAGNRES1	LAGINT1
DEP1	1.00732	0.395069	1										
DEP2	1.01659	0.471538	0.64039	1									
DEP3	1.0217	0.512541	0.51311	0.73562	1								
DEP4	1.03208	0.545643	0.46100	0.63541	0.78611	1							
DEP5	1.04089	0.562711	0.41777	0.57581	0.67601	0.79683	1						
LAGSIZE1	15.859	1.48781	-0.00629	-0.01260	-0.01473	-0.02084	-0.02167	1					
LAGLEV1	18.9549	14.2753	-0.01610	-0.02869	-0.02929	-0.04752	-0.05815	-0.00938	1				
LAGROTA1	7.83912	12.8401	0.01215	0.01770	0.01772	0.02903	0.03121	-0.24795	-0.20145	1			
LAGRDAS1	2.31751	4.01738	0.05231	0.08142	0.08634	0.09400	0.11381	-0.21056	-0.27418	0.12596	1		
LAGNRES1	0.0891829	0.344838	0.01744	0.00611	0.01083	0.00193	-0.01587	0.21257	0.07285	0.01092	-0.04661	1	
LAGINT1	3.98068	1.67003	-0.04832	-0.03853	-0.02000	-0.00755	-0.00278	-0.14577	-0.03302	0.08334	-0.01534	-0.02339	1
LAGOIL1	29.0336	8.98665	0.06628	0.08989	0.06112	0.04856	0.04693	0.12396	-0.04257	0.02562	0.02108	0.01285	-0.46433

Notes: Std. Dev. = Standard deviation; DEP = Dependent variable(s); SIZE = Employee size; LEV = Leverage; ROTA = Return on total assets; RDAS = R&D intensity; NRES = Number of environmental shareholder resolutions; INT = Interest rate level; OIL = Oil price (inflation adjusted); ***p < 0.01; **p < 0.05; *p < 0.1
Figures corresponding to variables other than means and standard deviations are Pearson correlation coefficients.

Figure 38: Regression analyses for full sample

	Model 1		**Model 2**		**Model 3**		**Model 4**		**Model 5**	
Dependent variable	DEP1		DEP2		DEP3		DEP4		DEP5	
CONSTANT	1.349	***	0.861	***	1.059	***	1.217	***	0.501	
	5.009		*3.099*		*3.560*		*3.848*		*1.464*	
Independent variables										
R&D intensity	0.000		-0.004		-0.003		-0.000		0.007	
	0.031		*-0.653*		*-0.489*		*-0.057*		*0.995*	
Shareholder resolutions	0.061		0.033		-0.003		0.024		0.007	
	1.204		*0.625*		*-0.049*		*0.400*		*0.105*	
Interest rates	-0.023	**	-0.028	**	-0.061	***	-0.088	***	-0.085	***
	-2.007		*-2.450*		*-5.313*		*-6.122*		*-4.026*	
Oil price	0.003		0.010	***	0.003		-0.001		0.013	***
	1.559		*3.254*		*0.693*		*-0.344*		*2.990*	
Control variables										
Size	0.014		0.034	**	0.044	***	0.046	**	0.068	***
	0.884		*2.150*		*2.609*		*2.535*		*3.379*	
Leverage	-0.002		-0.004	**	-0.004	**	-0.003	*	-0.002	
	-1.342		*-2.306*		*-2.450*		*-1.735*		*-0.999*	
Profitability	-0.000		-0.001		-0.001		-0.002		-0.002	
	-0.187		*-0.414*		*-0.588*		*-1.303*		*-0.973*	
SIC 2 digit industry controls	YES		YES		YES		YES		YES	
N	6060		5255		4519		3841		3243	
% of observations correctly classified	84.6		78.1		74.4		70.7		68.7	
Chi-squared	47.99	***	113.12	***	142.40	***	183.17	***	187.31	***

Notes:
Std. Dev. = Standard deviation;
DEP1 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-1)}$;
DEP2 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-2)}$;
DEP3 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-3)}$;
DEP4 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-4)}$;
DEP5 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-5)}$
***p < 0.01; **p < 0.05; *p < 0.1
Figures corresponding to independent variables are regression coefficients.
Figures in *italics* indicate respective t-ratios.

Figure 39: Regression analyses for selected time periods

	Model 6		Model 7		Model 8		Model 9		Model 10		Model 11		Model 12		Model 13		Model 14	
			1991 - 1996						1997 - 2001						2002 - 2006			
Dependent variable	DEP1		DEP2		DEP3		DEP1		DEP2		DEP3		DEP1		DEP2		DEP3	
CONSTANT	1.877	***	1.669	***	1.394	**	2.356	***	0.481		1.659	***	0.686		-0.449		0.108	
	3.774		*3.221*		*2.386*		*4.594*		*0.790*		*3.043*		*1.477*		*-0.951*		*0.220*	
Independent variables																		
R&D intensity	-0.007		-0.016		-0.019		0.001		-0.003		-0.006		0.012		0.012		0.013	
	-0.638		*-1.503*		*-1.601*		*0.111*		*-0.327*		*-0.632*		*1.204*		*1.256*		*1.444*	
Shareholder resolutions	-0.090		-0.164		-0.179		0.073		0.074		-0.010		0.044		-0.011		-0.049	
	-0.730		*-1.236*		*-1.195*		*0.902*		*0.874*		*-0.113*		*0.595*		*-0.149*		*-0.653*	
Interest rates	-0.022		-0.046	*	-0.107	***	-0.163	***	0.165	*	-0.123	**	0.030		-0.019		-0.054	***
	-0.810		*-1.721*		*-2.653*		*-3.881*		*1.785*		*-2.203*		*1.157*		*-1.288*		*-3.625*	
Oil price	-0.026	***	-0.020	**	-0.009		-0.002		-0.003		0.008		0.008	***	0.028	***	0.010	
	-2.803		*-2.276*		*-0.783*		*-0.428*		*-0.485*		*0.973*		*2.736*		*5.401*		*1.460*	
Control variables																		
Size	0.032		0.047	*	0.0804	**	0.0122		0.011		0.011		0.037		0.078	***	0.085	***
	1.227		*1.702*		*2.560*		*0.432*		*0.388*		*0.384*		*1.345*		*2.866*		*3.067*	
Leverage	-0.005	*	-0.008	***	-0.012	***	-0.001		-0.003		-0.004		0.000		0.001		-0.000	
	-1.859		*-3.072*		*-3.982*		*-0.397*		*-1.263*		*-1.255*		*0.147*		*0.212*		*-0.088*	
Profitability	-0.002		-0.002		-0.004		-0.000		0.000		0.002		0.001		-0.000		-0.000	
	-0.372		*-0.366*		*-0.855*		*-0.129*		*0.023*		*0.433*		*0.493*		*-0.185*		*-0.129*	
SIC 2 digit industry controls	YES		YES		YES		YES		YES		YES		YES		YES		YES	
N	2178		1702		1274		2406		2137		1916		2303		2153		1978	
% of observations correctly classified	82.9		74.0		70.4		87.7		81.5		75.3		84.0		78.8		76.2	
Chi-squared	28.62		55.62	***	92.99	***	40.94		35.03		40.04		51.82	***	131.25	***	127.62	***

Notes: DEP1 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-1)}$; DEP2 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-2)}$; DEP3 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-3)}$; DEP4 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-4)}$; DEP5 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-5)}$

***p < 0.01; **p < 0.05; *p < 0.1;

Figures corresponding to independent variables are regression coefficients.

Figures in *italics* indicate respective t-ratios.

Figure 40: Regression analyses for balanced sample

	Model 15		**Model 16**		**Model 17**		**Model 18**		**Model 19**	
Dependent variable	DEP1		DEP2		DEP3		DEP4		DEP5	
CONSTANT	0.638		-0.375		0.063		0.554		-0.303	
	1.209		*-0.711*		*0.115*		*1.022*		*-0.507*	
Independent variables										
R&D intensity	0.012		0.010		0.010		0.010		0.015	
	1.083		*0.989*		*1.020*		*0.945*		*1.368*	
Shareholder resolutions	-0.014		-0.069		-0.083		-0.011		-0.155	**
	-0.175		*-0.864*		*-1.039*		*-0.135*		*-1.749*	
Interest rates	0.029		-0.023		-0.063	***	-0.091	***	-0.112	***
	1.014		*-1.419*		*-3.967*		*-4.786*		*-2.810*	
Oil price	0.009	***	0.029	***	0.014	**	0.001		0.023	***
	3.024		*5.328*		*1.902*		*0.189*		*4.148*	
Control variables										
Size	0.038		0.074	**	0.086	***	0.084	***	0.113	***
	1.216		*2.447*		*2.792*		*2.627*		*3.279*	
Leverage	0.001		0.001		-0.001		0.000		0.002	
	0.224		*0.232*		*-0.236*		*0.082*		*0.666*	
Profitability	0.001		-0.001		-0.001		-0.002		-0.001	
	0.276		*-0.408*		*-0.443*		*-0.885*		*-0.378*	
SIC 2 digit industry controls	YES		YES		YES		YES		YES	
N	1901		1830		1720		1577		1408	
% of observations correctly classified	83.5		78.6		76.6		73.3		71.5	
Chi-squared	50.15	***	117.71	***	119.88	***	157.53	***	176.29	***

Notes:
DEP1 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-1)}$;
DEP2 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-2)}$;
DEP3 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-3)}$;
DEP4 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-4)}$;
DEP5 = $ENVSTRAT_{(t)} - ENVSTRAT_{(t-5)}$
***p < 0.01; **p < 0.05; *p < 0.1
Figures corresponding to independent variables are regression coefficients.
Figures in *italics* indicate respective t-ratios.

CHAPTER 8: THE EVOLUTION OF CORPORATE

ENVIRONMENTAL STRATEGY IN THE UNITED KINGDOM

8.1 INTRODUCTION

This last empirical chapter adopts a slightly different approach to studying the evolution of corporate environmental strategy by specifically using a more firm level and individual perspective. In particular, the study reported in Chapter 8 has the aim to investigate

- Whether and why environmental strategy has changed within UK firms over the last three years (if at all);
- To what extent individuals within the organisations have played a role in this development;
- Whether the conceptualisation of firms as fitness seeking complex adaptive systems is corroborated in this context.

To that end, in December 2008 semi-structured telephone interviews were conducted with 55 of the same UK-based companies that had already been interviewed almost three years before in order to investigate the longitudinal development of environmental management practice in the UK industry.

While previous chapters have mostly investigated the significance of field- and macro-level influences upon the nature of change in environmental strategy within a population of firms, Chapter 8 complements earlier research in this thesis by extending the analytical coverage to both macro- and, more importantly, micro-level. Particularly, the focus is set on the examination of whether firm-specific characteristics contribute to the evolution of corporate environmental sensitivity. In addition, this chapter entails a more in-depth analysis of the role of individuals in this context. In so doing, the chapter paints a richer and more detailed picture of the evolution of corporate environmental strategy than earlier chapters that had exclusively relied on quantitative methods. Consistent with the complexity oriented notion and approach of this thesis, this chapter therefore adds internal validity by illuminating the patterns found in Chapters 6 and 7 and by supplementing our understanding of change processes through the application of qualitative research methods.

The remainder of this chapter is structured as follows. First, it revisits aspects pertinent to this study from the conceptual development in Chapter 3 and provides a more focussed theoretical background. A further section analyses the findings obtained from this study before discussing them in a concluding section.

8.2 THEORETICAL BACKGROUND

Consistent with the theoretical framework and conceptualisation developed for the thesis, Chapter 8 aims to examine the longitudinal development of corporate environmental strategy from a complexity theory perspective. Based on the logic of the discussion in Chapter 3, therefore, the evolution of corporate environmental strategy can be explained with the help of the organisational metaphor of 'complex adaptive systems'. According to this view, an organisation develops and changes as the result of the self-organising behaviour of agents navigating 'fitness landscapes' (Kauffman 1995b) of market opportunities and competitive dynamics. Changing external and internal 'attractors' influence the process of adaptation by agents (Kauffman 1995b; Morgan 1996; Stacey 1996)" (as cited by Coleman 1999: 33).

The purpose of this study is to analyse how firms cope with turbulent business environments where responding to environmental issues only represents one particular aspect contributing to commercial challenges. To that end, an organisation is modelled as a complex adaptive system that seeks to maintain a satisfactory level of fitness in its dynamic environment. As I have argued above, for a commercial organisation, this fitness is chiefly determined by its ability to make a profit *and* to survive. The organisation consists of a variety of agents who, through their interactions with one another and their external environment, attempt to optimise their individual and systemic fitness in order to find peaks on the fitness landscape. However, due to the coupling effects of the different determinants of this fitness (in other words, the interdependence of a firm's functional strategies and attributes), finding the optimal contribution of a specific functional (here environmental) strategy imposes conflicting design constraints and thus makes this search more difficult.

A firm's environmental strategy, therefore, is adaptive organisational behaviour in response to environmental issues impacting the fitness landscape, and can be viewed either as threats to, or as opportunities for, improved organisational fitness. This view does not preclude the possibility that an organisation can voluntarily make significantly proactive steps in its environmental strategy if it perceives that such actions optimise its fitness in the given (or in a future) fitness landscape. However, since environmental strategy is only one of many coupled determinants of the overall fitness of the firm, other factors may override or reverse its environmental strategy in order to maximise profit and guarantee survival.

8.2.1 MOTIVATIONS FOR CHANGE, INDIVIDUALS, AND ORGANISING FOR CHANGE

Consistent with the organisational development, the conceptualisation and the research propositions developed in Chapter 3, the necessary preconditions for such organisational (change) behaviour are therefore threefold. First, agents need to be able to perceive and interpret the (personal and organisational) fitness landscape and decide that there exists a state gap between 'what is' and 'what should be' in order to rationalise a motivation for change. In the case of environmental strategy, agents need to be able to articulate a range of reasons and benefits of environmental management that are additionally supported by the perception of strong stakeholder pressures and macro-economic factors in favour of such an interpretation. Furthermore, agents must be able to a certain degree to anticipate the future development of their organisational fitness landscape in order to be convinced of the fitness contribution of any such changes.

Secondly, though, the perception and interpretation of the fitness landscape is greatly moderated by agents' personal views and attitudes towards organisational behaviour. Being able to understand the demands of the fitness landscape as well being motivated (in variety of ways) to act on such an understanding should be a further necessary requirement to organisational (change) behaviour. The role of the individual is thus hugely important, since through the recognition of the state gap, individuals can initiate change through interaction with other agents regardless of their position within the system. However, the extent to which this state gap recognition is occurring at different locations within the organisation may also have a significant impact on the way (environmental) strategy emerges.

Finally, the last necessary precondition is an organisational structure and context that supports the ability to change. Particularly within the environmental strategy context, this may depend on the existence of an environmental management system and the absence of organisational barriers and obstacles both within and outside the system. Most importantly, however, is the degree of coupling of environmental strategy and other functional parts and attributes of the organisation. In this respect, the integration and necessary contribution of an environmental strategy towards organisational fitness represents a conflicting design constraint, which ultimately determines whether, in which direction, and in how far an organisation's environmental strategy evolves over time.

In exploring the evolving patterns of environmental strategy responses, this chapter focuses on the interview responses obtained from repeating the telephone survey from 2006 with as

many firms as possible again at the end of 2008. By contrasting the responses from two different points in time as well as enquiring about organisational and contextual changes, this chapter provides a longitudinal study of the evolution of corporate environmental strategy based on primary data that is analysed using both qualitative and quantitative measures.

8.3 FINDINGS

8.3.1 EVOLUTION OF CORPORATE ENVIRONMENTAL MANAGEMENT

This section reports the findings from the interviews with respondents of the longitudinal survey. The key question of the survey asked respondents to describe in their own words in how far they thought that environmental management within their firms had changed over the course of the last three years, spring 2006 to winter 2008, if it all. These responses, which naturally only reflect subjective and qualitative judgement of the interviewees, were then scrutinised across the sample with respect to the existence of similarities in the statements. The aim was to allow respondents to describe freely and qualitatively in their own words the evolution of changes within their firms, rather than subjecting them to predefined concepts and thus influencing their responses. As a result, three different types of longitudinal evolution were identified that are broadly generalisable and which characterise the distinctive patterns found among the sample firms. A first category of firms is identifiable by inertia where there has been no change in environmental management since 2006. A second category, by far the biggest with 32 out of 55 firms, reports some form of gradual improvement across the years. Lastly, a third group of firms described the evolution of their firms' environmental management with enthusiastic attributes of large-scale improvements in comparison to 2006. There were 14 firms in this last group. None of the respondents stated that environmental management in their companies had worsened or been reduced in scale. This could be the result of a genuine assessment of the evolution of corporate environmental strategy. Alternatively, it may indicate the effects of social desirability and affirmation biases whereby respondents paint a more positive picture than is actually true (Crane, 1999). Another possibility is that those companies whose efforts have regressed over time are likely to be amongst the two-thirds of original firms who were unwilling to participate again in the follow-up survey (and their backtracking would provide an explanation for an unwillingness to discuss it). I will discuss this and other limitations of the research in Chapter 9.

Within the first group of firms, respondents were very brief in their assessment of the evolution of their corporate environmental management. Typical answers include:

'No effect at all. We continue as best as we can.', 'No, we're carrying on as we did.', 'It's pretty much the same.'

To a certain degree, respondents displayed a slight degree of cynicism, such as '*I think everyone is becoming more aware but I'm wondering whether they are sort of paying lip service to resolve in doing anything about it.*', '*I'm still on my own you know, I still run the business myself environmentally. It is probably the cost resource really.',* or *'We have to dedicate our time to it.'* In any case, respondents maintained that their *'biggest interest is* [being] *compliant with legislation and the second thing is reduce our costs, our waste costs.'*

More revealing are the answers from the respondents in the other two groups of firms in which environmental management had either gradually progressed, or even improved quite significantly. Interestingly, the responses of these two groups, which combined compose as much as 84% of the sample, mainly only differ from one another, apart from the characterisation of the degree of change, with respect to the industrial sector distribution as summarised in Figure 41, below. Across the responses, there is evidence to suggest that environmental management within the respective firms has improved due to generally greater focus and awareness, and better integration with the rest of the business. At the same time, environmental issues have become board agenda items and are therefore much better supported in terms of priorities, goals and targets as well as corporate resources. This has led to the introduction of new job responsibilities (as discussed in Chapter 4), and dedicated environmental working groups and subcommittees. While customers and employees have changed and have become more demanding, sophisticated and long-term oriented, the level of environmental competition has increased and this in turn has led to companies more seriously considering environmental issues already during product innovation. Equally, firms have become much better at measuring their environmental performance in terms of recycling and energy consumption to the extent that now results can actually be quantified and are more tangible, particularly for executives. This is often attributed to the introduction and the requirements of ISO 14001 and IPPC. Despite all these achievements, however, firms report an increasing level of complexity and the recognition that most 'low-hanging fruits' have by now been harvested making further improvements progressively more difficult to achieve. Generally speaking, progress has

been steady and gradual rather than having been suddenly triggered by a particular event. The following quotes typify respondents' views on this gradual evolution of environmental management in their firms:

'I think that the environmental perspective is more important today than it was three years ago… also to be able to stand up when employees come to us and ask questions and just to be in control… our marketing and we are considered as being a green company in the green tech part of the business. So we have very high expectations of being green in everything we do. We have the customer demands but we have a bit more work to do before we are actually in control all over.'

'Within the firm, it has improved. Yes, there is more centralized awareness now. We have regular meetings etc in different parts of the business. So it has improved. Yes it has become more topical.'

'We monitor what we can monitor, you know what will be next and our challenge to do something, we are not going to stop but it is becoming hard, so the rate for improvement is flowing. We are making incremental improvements, but it is becoming progressively more difficult.'

'Quite greatly, I would say that we have about 50% to 60% improvement on what we did in 2006 on how we handle waste, exhaust gases, storage of equipment and storage of fuel oils, etc., in which we are more environmental friendly now than we were in 2006. It has been a gradual change over the last three years or two years. But it has been supported by management.'

'Yes, it is more focused now. Yes, it is now simple, we have a subcommittee now for the main board which monitors environment actions with other companies and they're all linked together now […], a lot of the individual companies now have consolidated goals to it, with clear goals and objectives.'

The last type of evolution in terms of environmental management differs from the previous category chiefly in form of the statement of the degree of change over the course of time. Spontaneous responses, such as '*It totally changed.', 'Hugely!', 'Very dramatically!', 'Very significantly!'*, and '*It has fundamentally changed.'* exemplify that respondents perceive the evolution within their firms to have progressed to a much greater extent

compared with the previous group. This suggests that these firms have only lately started to recognise the significance of environmental management and have perhaps begun to 'catch up' with those firms in the previous category, which by now can only incrementally progress. In fact, when looking at the reasons for why firms were managing environmental issues in 2006, those that have now changed far more greatly used to express a predominantly cost reduction oriented attitude, whereas those that have (only) gradually improved over time, already back in 2006 cited a much greater variety of commercial reasons. Within this last group of firms there is also now an emphasis on the establishment of a variety of practices hitherto unheard of. As the following Financial Director (!) of an independent shoe retailer explains

'Yes, I think it has changed quite significantly. I mean starting with the top level, we do annual business plans and every two years, we do them so this is the first thing we might see built in a specific business plan which we have just got equal planning…. We set up an environmental group which has been running for over a year, and which is staffed from the company… We have actually started to get involved in just the last couple of months trying to measure carbon footprint for the company which is quite an interesting exercise.'

Repeatedly, within this last category of firms there is also the mentioning of measuring carbon footprints, something that does not appear in the previous category. On the whole, there appears to be a shift in the mindsets, especially among senior managers and executives, which has initiated more significant organisational changes that are based on the recognition of the potential of environmental management towards better managing businesses.

'I think the firm changed quite dramatically in the last three years. So just before, at that time I do not think we actually knew what we are doing. What we are now looking at is how we make improvements and a lot of the improvements that we have made on our carbon footprint, on our energy usage, on our wastage of being more business-related and a much being more business-focused, as well as not just trying to comply with us that--getting a tick… but now we are actually using it as a tool to improve our business.'

'Yes, it has changed quite a bit really. I could give you a list of several things that we have done. We have saved £276,000 worth of electricity. We have won national awards. It's publicity, as well as financially.'

'We have become a lot better integrated and coordinated. I think it was really just to the realization that we are going to improve our performance with greater synergies between the different parts of the organization.'

Prompted whether respondents were aware of any environmental investments or initiatives that, after their initial implementation, they subsequently have had to cancel or scale back, the prevailing response across all three change types (49; 89%) was *'No!'* The main reason cited in support for this response was that investment decisions are normally made based on the availability of financial resources and length of 'payback time', and so '*it is usually deemed to be a good cost effective idea or not, and so there is nothing being pushed on and withdrawn.'* The only notable initiatives that had been reduced or cancelled were cardboard recycling, because the prices had recently collapsed, and the other one being the decision to avoid the certification of environmental management systems whilst continuing with its implementation in order to save fees from paying for consultants and audits. Respondents stated that certification was not deemed to add enough value to the business.

Figure 41, below, provides an overview of the firm size, industry sector and other data distribution between those three clusters of firm behaviour. The table indicates that due to the skewed size distribution of firms among the sample, the majority of firms in all three groups are classed as being large (250 employees and more). However, a closer look at the average number of employees per group reveals that firms that have not changed their environmental strategy (inertia group 1) have far fewer employees in comparison with the two other groups. On average, they also appear to have a lower turnover and return less profit. Concerning the industry distribution, the majority in this first group of unchanged firms appears to operate in the engineering sector. Firms that have gradually changed over time seem to be mostly located in the electrical sector, while firms reporting significant change overwhelmingly constitute retailers. However, this industry distribution should be interpreted with care due to the relatively small sample size.

Based on this classification of organisational behaviour and change with respect to firms' environmental strategies, in the following, I will analyse why such different types of organisational behaviour and strategy may have arisen. To that end, the responses of the sample firms have been subdivided into three groups, each company according to its distinctive change pattern, and in the next parts of this chapter, I investigate in how far a variety of reasons consistent with the theoretical framework may be attributed to this differentiated phenomenon. Furthermore, the analysis will draw on a combination of

qualitative and quantitative results. For ease of reference for the supporting qualitative evidence, hereafter these groups will be referred to as groups 1 (inertia), 2 (gradual improvement) and 3 (significant change).

Figure 41: Overview of the three classes of longitudinal environmental strategy behaviour

	N	Large	Medium	Small	Average Turnover in 000s £	Average Gross Profit in 000s £	Average Number of employees
1 - Inertia	9 16.4%	6 66.7%	2 22.2%	1 11.1%	159,017	21,880	1,855
2 - Gradual improvement	32 58.2%	23 71.9%	5 15.6%	4 12.5%	921,536	498,046	8,282
3 - Significant change	14 25.4%	10 71.4%	3 21.4%	1 7.2%	748,351	201,627	7,269

	Engineering	Chemicals	Retail	Transport	Electrical	Food/Drink
1 - Inertia	3 33.3%	1 11.1%	2 22.2%	1 11.1%	1 11.1%	1 11.1%
2 - Gradual improvement	6 18.8%	5 15.6%	4 12.5%	6 18.8%	7 21.9%	4 12.5%
3 - Significant change	1 7.1%	3 21.4%	5 35.7%	0 0.0%	2 14.3%	3 21.4%

8.3.2 THE MOTIVATIONS FOR CHANGE

First, I examine to which extent agents' perceptions and interpretation of the organisational fitness landscape differ among the three groups and have therefore potentially influenced the way the organisation developed. In the survey one of the questions requested respondents to name the main pressures and reasons to manage environmental issues in their companies, and state whether there were any perceived benefits of doing so. Respondents typically replied with a variety of answers whereby reasons and benefits were frequently interlinked or synonymous. They can broadly be summarised as being some form of cost savings (29; 53%), legislative compliance (22; 40%), customer pressures in terms of winning new customers and retaining existing ones (22; 40%), marketing in form of enhanced PR, image, and reputation (15; 27%), and, perhaps surprisingly, also often

ethical reasons, such as *'obtaining a licence to operate'*, and simply because *'it's the right thing to do'* (15; 27%). Less frequent were the pressures from corporate headquarters (4; 7%), the implementation of an environmental management system (4; 7%), pressures from being listed on a sustainability index and from sustainable investors (2; 4%), explicit mentioning of environmental benefits (2; 4%), and pressures from employees (1; 2%). Normally, though, respondents stated any combination of these motivations with cost savings from reductions in energy, waste and water consumption featuring most consistently.

Figure 42: Drivers and benefits of environmental management by change type

Change Type	Cost	Compliance	Customers	Marketing	Ethics	HQ	EMS
	Count						
1	3	3	5	0	1	0	0
2	21	13	10	11	8	2	2
3	5	6	7	4	6	2	2
	Average						
1	33%	33%	56%	0%	11%	0%	0%
2	66%	40%	31%	34%	25%	6%	6%
3	36%	43%	50%	29%	43%	14%	14%

NB: 1 = no change, 2 = gradual improvement, 3 = significant change

By splitting up the incidence rates of the different types of responses by change group (Figure 42, above) a relatively evenly distributed picture emerges in which achieving cost savings and legislative compliance as well as retaining and winning new customers feature commonly across the groups. More notable, though, is the high frequency of counts for marketing and ethical motivations within the groups that changed both gradually and more significantly (groups 2 and 3). This suggests that in addition to a range of commercial factors, respondents articulated a driving force that exceeds pure economic success and instead emphasises a perhaps more enlightened awareness of the need for environmental responsiveness. The following quotes highlight some of the multi-faceted responses. The numbers in brackets indicate the change type group.

'It might be just legal implications, yes.' (1)

'Well the pressures tend to come from legislation if you like. But they are not that strong. The main pressure comes from within, from ourselves and they just sort of—we have seen

the way the world is going and we want to recycle more, to be honest with you we cannot.' (1)

'It is not really a pressure for us but it is kind of ethical. That is the right thing to do. I know there is legal requirements out there as well but we have a saying that we are trying to go beyond compliance and compliance is obviously legislation requirement and we try and go beyond that wherever we can so it is more an ethical thing for it. It is just the right thing to do; it is part of our culture. Yes, it is obviously cost benefit and then the PR benefits and then environmental benefits to the just local environmental community and it is good business.' (2)

'One of the major of these are to minimize the impact on the environment, legislation and to save money basically throughout the resource management. And the major benefits obviously are compliances and legislation and saving money. And also, the publicity as well. We have been able to show our customers those weekly.' (2)

'It is compliance within reputation, compliance and law and public image. And also, there are cost benefits.' (2)

'To reduce our environmental impact. It is mostly an ethical reason but it also satisfies some of our customers' demand.' (3)

'*No, it is obviously regulatory drivers as well. But in terms of that the real drivers for energy management, as the pinch comes on, then the energy costs increase. That is where, you know, it is coming from the MD to save money.' (3)*

'The main pressures would be I think we have got to address the CRC commitments. We are not an organization that technically falls within the category. I think ethically, we need to be seen to be reducing our carbon footprint.' (3)

'Everybody now has—as well as the payslip, they get what is called a "Total Reward Statement" and it would be what your salary is, how that is that broken down. And then on the second page, there is all of the things like fair trade we're doing, carbon footprint work, what is the usage work, a bit about the environment indices that we produce each year. So, if you talk about graduates now, based in our rate charts perspective is that, all the graduates leaving the university want a career that will give them enough cash to buy

Ferrari, but they do also like to save the planet as well. So, it is just around about making sure that we appeal to uphold aspects of people's personality as a public…' (3)

Respondents were then asked to rate their perceptions of the levels of pressures received from stakeholders. The following Figure 43 summarises the differences in perceptions as rated by respondents both in 2006, and again in 2008.

Figure 43: Paired sample t-tests for stakeholder pressures 2008 vs. 2006

		Average levels of stakeholder pressures					
	Year	Government	Customers	Employees	Shareholders	Environmental Organisations	Local Communities
Full sample	2006	5.691	4.164	3.127	4.222	3.327	3.685
	2008	5.527	4.036	3.426	4.364	2.527	2.927
	Change	*-0.164*	*-0.127*	*0.296*	*0.289*	*-0.800*	*-0.759*
	t	-0.697	-0.495	1.28	1.265	-2.921	-3.592
	Sig.	0.489	0.622	0.206	0.212	0.005	0.001
1 - Inertia	2006	5.000	4.556	1.889	3.714	3.111	2.667
	2008	5.889	3.333	3.333	3.667	2.000	2.556
	Change	*0.889*	*-1.222*	*1.444*	*0.778**	*-1.111*	*-0.111*
	t	1.650	-1.692	2.393	1.050	-1.512	-0.0263
	Sig.	0.137	0.129	0.044	0.334	0.169	0.799
2 - Gradual improvement	2006	5.906	4.031	3.406	4.286	3.031	3.452
	2008	5.219	4.063	3.323	4.438	2.563	2.656
	Change	*-0.688*	*0.031*	*-0.188*	*0.688*	*-0.469*	*-0.688*
	t	-2.075	0.104	-0.317	0.708	-1.371	-2.770
	Sig.	0.046	0.918	0.753	0.485	0.180	0.010
3 - Significant change	2006	5.643	4.214	3.286	4.400	4.143	4.857
	2008	6.000	4.429	3.714	4.643	2.786	3.786
	Change	*0.357*	*0.214*	*0.429*	*0.300**	*-1.357*	*-1.071*
	t	1.439	0.385	1.194	0.487	-2.379	-2.599
	Sig.	0.174	0.706	0.254	0.638	0.033	0.022

NB: *The change values are not the arithmetic difference between the average levels of 2006 and 2008 but rather represent the results of the paired sample t-tests; in effect, they are the average of the individual firm changes. In most cases, they amount to the same value but in some cases, a deviation between the two results.

As shown in the paired sample t-tests in Figure 43, above, the biggest changes across the full sample have happened with respect to the levels of pressures from environmental

pressure groups and the local community. Both have strongly and significantly fallen across the sample of firms over the period 2006 to 2008. At the same time, the pressures from employees and shareholders have slightly, even if not significantly, increased. Pressures from the government and customers have negligibly decreased. Other relevant stakeholders listed by respondents were insurance companies, senior management, the media, and trade associations.

A closer inspection of the changes in stakeholder pressures with respect to the different types of change reveals a slightly more differentiated picture. Firms whose overall level of environmental management has not changed over time saw increases in government pressure (unlike the full sample) and in pressures from shareholders. The biggest increase, however, came in form of pressure from employees, which is significant at the 0.05 level. By contrast, firms that have witnessed a gradual improvement in environmental management over the last three years indicated that most of the stakeholder pressures were decreasing, in particular those from the government and the local community (both significant at 0.05 level). At the same time, pressures from customers and shareholders only very lightly increased. Finally, firms that had described the changes in environmental management as being more significant than within the two other groups perceived the pressures from environmental pressure groups and the local community to be decreasing significantly at 0.05 level, whereas all other stakeholder pressures increased only slightly.

These findings seem puzzling given that firms that reported the greatest increases in stakeholder pressures of all three groups also indicated that their environmental management practices had not changed. This could, on the one hand, be a problem in terms of perceiving and interpreting stakeholder pressures correctly, or that other factors play a (bigger) role in determining firms' environmental responsiveness over time. In this context, it may be important to consider the starting points, or average levels of pressures, in these discussions. When exploring the average levels of the different stakeholder pressures at the different points in time, it is notable that the inertia group had the lowest average level of stakeholder pressures in four out of the six categories in 2006. Particularly, the average level of employee pressure was far lower (1.899) than for the other two groups. However, this stakeholder pressure level has now significantly risen to roughly the same levels as for groups 2 and 3. This could suggest that employee pressures play an important role in terms of initiating change, and it may also give some clue as to what the future for the firms currently in this inertia group may hold. Firms that changed more significantly (group 3) had the highest average levels of pressures from

environmental organisations, shareholders, and local communities in 2006; however, these have now in 2008 dramatically dropped (with exception of shareholder pressures) – perhaps because of the actions the firms have taken in the meantime?

Nonetheless, there is a question of causality that this data cannot unpick. The question, specifically for the inertia group, remains: Have their stakeholder pressures now in 2008 suddenly increased because of their unchanged behaviour, or have firms been inert with respect to their environmental strategies in spite of increasing stakeholder pressures? Thus, because the changes in stakeholder pressures stem from panel data taken at the end of 2008, they reflect perhaps the fact that those firms that have not changed now, as a result, perceive pressures to be greater, unlike those firms that have changed over the course of the three years.

Following the recent turbulences in the financial markets leading to worldwide economic recession, of particular interest for this research was to explore in how far macro-economic factors are impacting upon firms' financial and especially environmental performance. To that end, respondents were asked to judge and describe in how far the current economic situation had an effect on their firm's environmental management practices. Again, responses varied significantly indicating at the one extreme prudent financial management and reliance upon long-term contracts and orders. At the other end of the spectrum, respondents feared huge and detrimental effects on corporate profitability. Despite such variation, however, respondents' broadly expressed general optimism in their assessment of the continuation of environmental management practices in the face of such adversity. As expected, there were firms where environmental practices would '*have to be put on the backburner'* (3) and all efforts were being channelled towards corporate survival. In other cases, this referred to putting on hold any new capital expenditures for big environmental projects, while existing environmental management practices would continue as before, not least because '*it's a core fundamental part of this organisation as a company' (2)*, *'it's such an integral part, so we still consider the environmental implication of everything we do' (2),* and because it was important to maintain the 'green reputation' and retain customers' goodwill particularly during the recession. Thus, while budgets had been cut and bigger projects rescheduled, there was enough evidence to suggest that many environmental practices had gained enough momentum to continue through these times of economic hardship. In fact, for many firms the economic situation actually had rather positive side effects with respect to environmental management. This could come firstly from senior managers recognising the financial contribution made by environmental

management towards cutting costs and achieving substantial savings. Secondly, many firms decided to use the downturn as a catalyst for corporate reorientation and start pushing certain products and services even more in the hope of selling to other customers themselves interested in cutting costs.

'I think at the moment, whatever price, it will be King. Price will be King, as far as everything is concerned. We will not be spending money on fancy dancing. You work, you stay in business.' (1)

'In the short term, our environmental issues will have to be put on a very low burner because survival is more important than (Inaudible) so it is a question of saving money wherever we can. The environmental issues tend to cost money as supposed to save money. So we will have to obviously, stay compliant with any legislation.' (1)

'From the point, it may be difficult. But as far as environmental management on site is concerned, I do not see the effect as greatly.' (2)

'I think we are going to appear where environmentally friendly products are perhaps less important to the consumers or customers, because of other financial pressures, which is always a bit of a worry. I think once the things are settled though, which we are all hopeful well in due course, that the issues have not—big issues have not gone away. No, I do not think, everything is up and running. There are lots of the things, our capital items that put in—capital indemnity, fittings and energy efficient fittings and so, and so they have done industrial there, so no. Because we could stop recycling but afterwards --It does not look good.' (2)

'The current economic situation does not affect it at all. In fact not in an adverse way, in fact, that the, it is been, looking after environment brings commercial benefit, savings on materials and so on, or perhaps an income from what is being recycled and it can only have a positive benefit kind of certainly not, certainly not negative. No, they remain important and we hope it is more important in the future.' (2)

'We have just agreed realignment to target the environmental management in the next three years because that is where we see the growth versus our traditional business. So we are having like many companies, a tough time. There are two ways to respond to a tough time. One is you take the hatchet and you cut things. The other – which we have had to do in certain places – but the other is re-evaluate your business model and say can we benefit

out of this and in the downturn, energy costs and efficiency are what people look at and we have got products that our customers do that so therefore we have realigned our strategy for the next 12 months to, I would not say gnaw but to be less responsive to our traditional business and more responsive for the environmentally driven business. It is a catalyst.' (2)
'I think not just financially but all pressures, legislations, stakeholders, competitors, client requirements. All of these external drivers are making it such that I think the environmental performance on our part is going to be one of our 'USPs'. As a business, we offer to contribute to conferences and seminars, that sort of thing so I think our name is getting about and clients are increasingly asking us to help improve their own environmental performance whether we are doing that at the moment or not. It might affect the scale of investment. But we would be looking at improving our environmental performance and getting greater efficiencies.' (3)

On the back of these qualitative findings, the next question required respondents to rate on a Likert-scale of 1 to 7, in how far they thought that the following macro-economic factors had any significant impacts on their firms' overall environmental strategy (7 being the highest impact).

Figure 44: Descriptive statistics for economic factors in 2008

	Full sample			Change type 1		
	N	Mean	Std. Deviation	N	Mean	Std. Deviation
Oil Price	55	5.15	1.938	9	4.89	2.315
Interest rates	55	4.18	1.837	9	5.00	1.658
Business Sentiment	55	4.78	1.560	9	4.78	2.108
Consumer confidence	55	4.22	1.912	9	4.22	2.167
House prices	55	2.98	1.920	9	2.33	1.871
Stock market indices	54	4.09	1.993	9	3.11	2.315
Tax Rate	47	4.49	1.679	8	5.75	1.035
Price of Carbon	54	3.7	1.978	8	3.13	2.475

	Change type 2			Change type 3		
	N	Mean	Std. Deviation	N	Mean	Std. Deviation
Oil Price	32	5.19	1.693	14	5.21	2.326
Interest rates	32	3.78	1.660	14	4.57	2.174
Business Sentiment	32	4.59	1.365	14	5.21	1.626
Consumer confidence	32	4.00	1.849	14	4.71	1.939
House prices	32	2.97	1.805	14	3.43	2.209
Stock market indices	32	3.88	1.809	13	5.31	1.750
Tax Rate	28	3.86	1.533	11	5.18	1.722
Price of Carbon	32	3.38	1.773	14	4.79	1.847

As shown in Figure 44, above, and corroborating the findings in Chapter 7, across the full sample the oil price has the most significant perceived impact upon firms' environmental strategy, not least because of its effects on energy prices. Least important were house prices, and although the price of carbon was currently rated as having a relatively small effect, many undoubtedly predicted this to change in the near future should emissions cap and trading schemes become mandatory. Other factors repeatedly mentioned were exchange rates and climate change. Splitting the data into the three change type components reveals that these macro-economic factors again seem to influence firms in slightly different ways. While house prices remain of least importance across all three groups, the corporate tax rate appears to have a much bigger effect on firms that have not changed their environmental management across the three years than the two other types. In addition, while the price of oil is of very high significance for both change types two and three, for the last category of firms a much wider array of further macro-economic factors, such as the business sentiment and stock market indices, appear to be important in stimulating environmental proactiveness. Of relevance is also the fact that the price of carbon reaches its greatest impact for firms that claimed to have made the biggest progress during the last three years. This would corroborate earlier findings, which suggested that especially firms in this last group repeatedly mentioned the importance of measuring their carbon footprint as part of their environmental responsiveness.

Figure 45: Change type versus future outlook of environmental management

	No change	Increase	Decrease
Change Type	**Count**		
All firms	32	19	2
1	7	1	1
2	18	11	1
3	7	7	0
	Average		
All firms	58%	35%	4%
1	78%	11%	11%
2	56%	34%	3%
3	50%	50%	0%

NB: Two firms could not be classified

Finally, having examined the changes of environmental strategy between 2006 and 2008, respondents were also given the opportunity to make predictions of the future trends. The forecasts are rather telling. 32 predicted that their corporate responsiveness to environmental issues would remain more or less as significant as at the end of 2008, 19

respondents foresaw significant increases in the next three years, and only two predicted that environmental management would diminish in its importance or at least level out very soon. Controlling again for change type (Figure 45, above), the figures suggest that the vast majority of firms within the category of change type 1 do not foresee any kind of change of environmental management within their firms in the next three years. This stands in marked contrast to firms in the change types 2 and 3, which are split in their anticipation of either a continuation of the status quo, or a likely increase in intensity and focus of environmental management in the years to come. Typical responses were:

'I think there is still a concern there but perhaps the emphasis on it will lessen.' (1)

'I think the general outlook is quite bleak to be honest. You know, I do not think the company is willing to spend money into it if it has to, unless it has to, on any environmental improvements. Well, I think it would still be around, but it is the case of finding the most cost effective method of the complying.' (1)

'No it will continue to be an important part of the business. Yes there will be. Every year, I have to meet new objectives and target, it is part of the requirement of ISO14001.' (2)

'Yes, I think it will grow and we will have to go along with it sort of thing. If it was not for all the pressures outside, I am not sure we would take it so serious or it would be such an important impact.' (2)

'Crystal ball times. Yes, I mean from one point, one effect is that it is having a positive effect inside us when I am looking to make savings. The other side of course is that sometimes, to make savings you have to make some investments so that becomes a bit more difficult. I think it will continue definitely, and I think it will probably get stronger.' (2)

'I think it will be mainstream. I think it would not be considered as an additional investment. It will be considered as a routine.' (2)

'Yes! It is still going to be important in 3 years' time.' (3)

'Oh yes. In three years time, I would expect that we are back to full employment and full business and that these things will then take off and we will be going again for the standards.' (3)

8.3.3 THE INDIVIDUAL AND CHANGE

Given such variation in organisational behaviour with respect to environmental management, a key consideration of this longitudinal survey was to uncover the mechanisms behind this organisational change. More succinctly, do agents' personal views and attitudes play a role in affecting organisational behaviour? Accordingly, respondents were asked to state who, in their view, they believed to be the initiators and drivers of environmental responses within their respective firms. One of the most frequently recurring responses (27 out of 55, 49%) was '*Me!'* usually followed by some form of acknowledgment of the help of others, mainly senior or technical managers. The results appear to be independent of change type (66%, 44% and 50% respectively for groups 1, 2 and 3). To some extent, this reaction is not at all surprising given that the aim of the research was to interview the person most knowledgeable of and therefore likely to be the most involved in environmental issues within their organisations. Particularly within smaller firms, the survey respondents often considered themselves to be the lone voice or advocate of the environment.

'I think it is me, I mean, I have come to the conclusion that if I did not drive it, it would not happen.' (1)

'I think generally I have become more of an advocate of environmental management and environmental issues in almost three years ago. And I become more aware of those issues and the importance of it.' (2)

With growing company size, however, the drivers of organisational change become increasingly diffused in the sense that environmental responses can equally be 'Top-Down', 'Middle-Outward', or 'Bottom-Up' driven. More frequently occurring is a combination of these change paths whereby, for instance, company executives specify board level strategies comprising goals and targets as well as major investment plans, while low-level developed initiatives deal with the day-to-day environmental issues as part of employees' personal job responsibilities. Of equal importance are the type, temporal horizon and size of the environmental initiative, since bigger investments usually require more rigorous capital expenditure decisions and are thus more likely to depend on senior managers' approval. Broadly speaking, the initiators of environmental change appear to vary greatly from company to company.

'So basically it gets reported to senior management and the board of directors. Ultimately, down to their decision who—they are driving the company, they are directing the company so it is time to administer what direction they want the company to go.' (1)

'It is all the people from other departments I am leaning on. I would say it is a middle-outwards. I certainly would put this not a top-driving-it-down, I am sort of in the middle, so I think both ways.' (2)

'If you wait for the top down driven, you will wait forever. It is very much driven from bottom up.' (2)

Interestingly, it would appear that firms that have changed either gradually or more significantly rely to a much smaller extent on top-down driven initiatives for environmental responsiveness in comparison to firms that have not changed. Instead, these firms appear to be sufficiently able to change their firm's environmental strategy both from the bottom-up and middle-outward layers of organisational hierarchy (Figure 46, below). By contrast, firms that have not changed their environmental strategy do not report that consultation and empowerment of low-level employees is happening within their environmental management processes.

Figure 46: Change type versus driving mechanism of organisational change

	Bottom-up	Middle-outward	Top-down
Change Type	**Count**		
All firms	23	42	31
1	0	8	5
2	13	22	21
3	10	12	5
	Average		
All firms	42%	76%	56%
1	0%	89%	56%
2	41%	69%	66%
3	71%	86%	36%

Instrumental in the implementation of any such environmental strategies are, on the one hand, greater pressures upon senior directors to have environmental performance contributing to their remuneration packages, as are, on the other hand, cross-functional teams and suggestion schemes, which, often managed online, incentivise *all* employees to

raise ideas and suggestions in return for cash prizes and awards. Especially in the latter context, several respondents raised the significance of nominating environmental champions and co-ordinators that would actively provide incentives and listen to employees and thereby act as enablers and achieve substantial degrees of empowerment with regard to environmental issues.

'All employees can do that and I now try to be as visible as possible in the organization and start to receive a lot of questions and initiatives from different countries asking me "we need to improve this, how can we do it" or "what would you like us to do".' (2)

'I love to see what people are coming up with. I give them a response to see that on the actual system, they can see that I have acknowledged their suggestion, and then they can see why actions have been put in place to deal whatever they have come up with.' (2)

'The new manager actively encouraged them not just to say it but put it in writing and because he encouraged them by feeding it back to them I am putting their ideas up and it was a small token for about 50 pounds. It is just not a lot of money but it is just recognition that their ideas are being listened to. It is probably the biggest individual reason why our environmental improvement changed so dramatically, probably because that would be enabled and empowered and that being listened too…He is very much the boss but at the same time he encourages and actively listens to peoples ideas.' (3)

Given the emerging understanding that all individuals at all levels can influence environmental management to varying degrees and thus initiate intra-organisational change, a further survey question sought to establish the more personal opinions held by the respondents and whether they thought that their views with respect to environmental management had changed over the last three years. Interestingly, a great number of respondents (32; 58%) acknowledged that, regardless of what was happening within their organisations, their personal views had not changed significantly. The findings are very similar across all three different change groups (56%; 59% and 43%). This observation on personal views does not necessarily reflect apathy or resignation (although in some cases it does), but rather takes into account that often respondents could claim something of a pioneer status in terms of environmental management, whereas the rest of the organisation was now finally catching up.

'I would not necessarily say that my own views, my own approach this has changed. It has obviously evolved, it has grown, it has developed to the consequence of continued sort of development continued learning within the role and through exposure to a variety of issues but I would not say it is fundamentally different.' (2)

'No, I think mine is probably pretty much the same and that did not need any initiatives recently.'(2)

'I have always been pretty committed to it. So it has not really sort of changed for me personally.' (2)

'I think they are the same as they would have been you know, in the days important. I certainly believe that there is a—you are better of being insider than an outsider it is easier to change and influence things far more effectively than just banging on the door.' (3)

At the same time, however, several respondents described their personal views as becoming increasingly cynical, particularly with respect to the lack of Government and customer support, and they criticised the growing burden and complexity of legislation leading to unfair disadvantages for British industry, which in turn forced them to take more hardened and purely economic views.

'I have become more cynical. The sheer cost that is dumped on industry.' (1)

'It often stumbles at the point when they need to spend some money and I think maybe I am probably not alone in this respect. The company is a little short sighted in huge potential with actions, maybe in case you got to spend a bit of money now but you would potentially get the money back, it will take three years. I suppose in the current financial climate, spending the money now is actually the issue, which, unfortunately, is the current climate.' (1)

'I still think that my own views become more frustrated really with lack of help. As from legislative bodies from the likes of the environment agencies etc. and by the local tax and people like that I think could be doing more to help businesses tax because we all want to protect the environment the future, etc. We all need a little bit of help and guidance and it appears to me that it is one-way trip.' (1)

'I am absolutely frustrated about the way things are influenced by the government. And by the legislation and then the lack of support of it, like with energy recovery.' (1)
'No, I do not see it has been any different but the only thing of course is that too many new regulations coming out and you put a barrier against manufacturing in this country. No, no, no. It is down to placing us in a disadvantaged market compared with people in the Far East and indeed in some of the European countries.' (1)

'I used to consider myself as quite sort of practical and pragmatic, my approach to environmental management. I would say that it has hardened and even more just over the last two years, because I realized that I am not going to get anywhere in getting environmental improvements.' (2)

'I may be becoming more sceptical now. Climate change and things, I am not a subscriber for that one…And so if anything, it is more bureaucratic on its own to some of these environment issues which are not going to actually put bread on the table.' (2)

'No, pretty much the same. Really, I maintain a cynical attitude to it.' (2)

Despite many such negative views, there is also evidence of the opposite happening where the respondents' work is finally becoming recognised by companies as being vital both in environmental and economic terms. This has led to the upgrading of respondents' job responsibilities (as discussed in Chapter 4) who consequently experience greater emotional payback in form of feeling more of a contribution to, and involved in, their businesses.

'I am now viewed so much more important now by my colleagues because they can see, that slowly customers are paying more attention… so then I am still committed as ever but now I am feeling more satisfied and—Yes, that is supported and I am more appreciated for what is being done.' (2)

'I think my role has gone from seen as being something that was necessary to something that was important to now, it is something that is essential… And it is almost it has become mandatory now and it certainly most in two years ago. That has helped me considerably. Which is very much a two-way thing because of, you know, they need me as much as I need them and it used to be I needed them more than they needed me but I think the balance has changed. Because obviously, customers are getting better and better educated on environmental issues and some of it are now is getting very, very technical and people

within the company realize that you do need somebody with environmental expertise to put a customer through too. And I think companies that do not run that kind of help will lose their customers.' (3)

Lastly, one of the most interesting aspects of respondents' answers with regard to their personal views is the increasing level of fusion between their attitudes and opinions of work and private lives, a trend that appears to work in both directions. The effects of such blending of attitudes and values might to a certain degree explain individuals' propensity to engage as internal change agents within their organisations.

'I am very caring about the environment and at home, I do all the recycling and all that kind of good stuff and save water and compost heaps and all that kind of stuff so I do it at home as well as at work. That is another emphasis we are trying to push in our organization, not just come to work and do outside work. So we call it safety culture, 24/7 safety. The EHS [environment, health & safety] *is the same.' (2)*

'I think on a personal level yes, we are greener at home, we are greener at work and I do not think you can help but be greener and in the current economic climate, whether green is the right word or environmentally aware or a different word. I do not know, and our children nothing, I think that, you know, from all the way along this age is pushing as well. So, I think you talk to people and I bet their children are doing all and talking to them about it. So I think it is the education system that is pushing that as well.' (2)

'I get quite influenced by quite a lot of things I see on the TV. Yes I act on those. When I see something I think that is a good idea. I implement it in my system.' (3)

'I mean personally, I am an outdoor person if you like. Therefore the resources that we have, we should looking after them and I think the general level or wish that we covered in this company is incredible. And I think that the vehicles, simple recycling all your garbage and stuff like that. I think they make good sense, it is not something that is difficult to do.' (3)

'I would say that I have done a complete U-turn. I just think that the wills have been raised and there are simple things we can do to save the environment, like nowadays, it is just incredible, it actually became a hobby of mine. In my personal life as well as my career…

and a lot of people bring this stuff into the company as well where there is no written environmental policy.' (3)

8.3.4 ORGANISING FOR CHANGE

Faced with such variation in the interpretation of the organisational fitness landscape as well as agents' differing degrees of views on, and involvement in, corporate environmental management, within the last section of the analysis I investigate whether the organisational structure and context plays a moderating role in facilitating and obstructing organisational change. As part of firms' environmental strategies a growing trend is the rising rate of environmental management systems (EMS) implementation. In fact, between 2006 and 2008, the number of firms within this sample with a certified environmental management system statistically significantly increased from 29 to 38, a rise which does not take into account the number of firms which may operate to the standard but which do not, or no longer, certify them. Almost unanimously firms adopted ISO 14001 for their EMSs. More specifically, however, this increased rate of EMS adoption is solely attributable to firms of the change types 2 and 3. Except for one other type of EMS adoption by a firm in the inertia group, all other 8 new adoptions have been ISO 14001 among firms in equal measures in groups 2 and 3.

In contrast to such facilitating factors, the survey also sought to establish in how far barriers and obstacles to efficient environmental management implementation had changed over time and thus impacted upon firms' behaviour. To that end, respondents were asked to rate their perceptions of the significance of different barriers on a Likert-scale. The results were then compared to 2006 data with the help of paired sample t-tests.

As indicated by Figure 47, below, the greatest change in terms of impeding firms' environmental management has taken place with regard to the lack of financial resources, a statistically significant increase in the mean response by 0.759 (significant at the .01 level). Average responses for lack of senior management support, lack of technological and skilled human resources have all equally risen, however, not to significant extent. At the same time, lack of clear financial regulations as a barrier to effective environmental management has slightly decreased in importance. Repeatedly, respondents bemoaned the lack of a recycling and waste management infrastructure and cited this as a major obstacle in becoming more environmentally friendly. Responses such as, '*It does not appear to be any recycling facility in this country which can help us with that. Certainly for this area*

where we generate waste and I find it frustrating to train employees to be green and be more environmental gradually when there is no option to do it' (1) highlight the problems involved. Other barriers cited were the *'Lack of planning from a policy perspective, in planning rather than from an implementation perspective'* (2) as well as general customer ignorance.

Figure 47: Paired sample t-tests for barriers and obstacles 2008 vs. 2006

	Full sample				Change type 1			
Lack of	Mean	Std. Deviation	t	Sig. (2-tailed)	Mean	Std. Deviation	t	Sig. (2-tailed
Senior management support	0.327	1.775	1.367	0.177	1.111	1.965	1.696	0.128
Skilled human resources	0.204	1.837	0.815	0.419	1.875	2.100	2.525	0.040
Financial resources	0.759	1.971	2.831	0.007	1.889	2.472	2.292	0.051
Information	0.037	1.479	0.184	0.855	0.250	1.832	0.386	0.711
Clear regulations	-0.364	1.975	-1.365	0.178	-1.222	2.438	-1.504	0.171
Technical solutions	0.382	1.967	1.439	0.156	1.222	2.108	1.739	0.120
Green product demand	-0.077	2.028	-0.274	0.786	1.556	2.186	2.135	0.065

	Change type 2				Change type 3			
Lack of	Mean	Std. Deviation	t	Sig. (2-tailed	Mean	Std. Deviation	t	Sig. (2-tailed
Senior management support	0.500	1.741	1.624	0.114	-0.571	1.453	-1.472	0.165
Skilled human resources	0.000	1.437	0.000	1.000	-0.286	2.091	-0.511	0.618
Financial resources	0.677	1.681	2.244	0.032	0.214	2.082	0.385	0.706
Information	0.062	1.458	0.243	0.810	-0.143	1.406	-0.380	0.710
Clear regulations	-0.188	1.975	-0.537	0.595	-0.214	1.626	-0.493	0.630
Technical solutions	0.281	2.083	0.764	0.451	0.071	1.542	0.173	0.865
Green product demand	-0.100	1.605	-0.341	0.735	-1.154	2.193	-1.897	0.082

For firms without any change in environmental management almost all barriers and obstacles appear to have increased over time, particularly lack of skilled human resources (significantly at 0.05 level) and financial resources. Only lack of clear regulations decreased. Companies reporting a gradual improvement indicated that the barriers with the greatest increase in impact upon their firms' environmental management were financial

resources (significant at 0.05 level) and senior management support. All other barriers remained relatively stable over time. Finally, firms witnessing the greatest changes in terms of their environmental management at the same time perceived almost unilateral reductions in their perception of barriers and obstacles. Although none of those changes were statistically significant, the means for lack of demand for green products and senior management support decreased the most.

As part of the survey, a further question aimed to determine whether, and to what extent, respondents thought that their environmental strategy was in any way integrated with, tied to, or dependent upon other functional strategies within their organisations. The purpose of this question was to gain a qualitative understanding of the coupling of environmental strategy with other functional strategies. Generally speaking, respondents characterised their structure along a continuum of different levels of integration, ranging from '*not at all'* to *'fully integrated'*. Importantly, however, 'fully integrated' could mean different things to different respondents. Integration was usually achieved in combination with various different functional strategies and comprised health and safety, quality, marketing, human resources, new product development (NPD) and research and development (R&D), financial and risk management, operations, supply chain, logistics and IT management, a total management system, as well as board level executive decisions and corporate planning. Some stated that it was fully integrated into all functions, while others perceived it to be running independently and alongside the rest of the business.

'Minimally I think. Compliance only.' (1)

'What it means is that every manager when he's got any business plan through anything that they are doing across the business has to make sure that they show the effects on each one of those five corporate goals with the department there in its place.' (2)

'Importantly our environmental strategy is one element of our overall business approach. And our strategy for developing new products, how we take those market, how we manufacture, how we distribute, all of those also play into this particular equation.' (2)

'Exactly integrated. With quality safety and environmental concern. So it is all in the management system. Marketing, no.' (2)

'I think it is just awfully integrated so, 90% integrated, maybe above 90%, basically whenever we take you know that all and all, the risk management process looks, the kind of financial side alike, the health and safety side, the quality—you know.' (2)

'Not hugely. It is there and the staff are aware of it, everybody right across in relation of this very big organization, where and what we are doing, but I would not say it is firmly embedded in their thinking, they 'second-guess' themselves.' (2)

'I would say it is not at all. It probably still operates reasonably independently from that. But we do not have an integrated management system or a strategy in mind.' (2)

'It is imbedded. Completely imbedded, it is you know, reported out. There are board members sit on steering committee at senior level. It is one of our core values whichever way you want to spin it. It is imbedded in to what we are doing (Inaudible) we have here.' (3)

'It is definitely linked particularly on our quality management system. We will ultimately go for fully integrated system so it certainly links in with that.' (3)

Mirroring such diversity in levels of integration respondents equally viewed the contribution of their environmental strategies very differently albeit with increasing levels since 2006.

'I do not think it contributes to the business in a sort of way. It is sort of bit runs side by side. It is a consequence of the business rather than an asset to the business for units here.' (3)

'Like I said, it contributed a tangible amount of money last year, almost £300,000 worth of savings.' (3)

For some firms cost and economics still dominate their decision making in the context of managing environmental issues, not least because of their small firm size. For others it is a matter of '*maintaining our green profile'*, carrying out scenario planning to be able to better anticipate customer trends and achieving general business continuity often tied to corporate goals and targets.

8.4 DISCUSSION

In this section, I reflect upon the evidence discussed above and its relationship to the conceptual development in Chapter 3. Having analysed the evolution of corporate environmental strategy among British firms over the last three years, the following three tables summarise the findings for the different types of change groups. Figures 48, 49 and 50, below, describe in how far the motivations for change, individuals, and organising for change, as investigated through a variety of survey questions, explain the emergence of different patterns of corporate environmental responsiveness over time. More specifically, they summarise several characteristic differences typical for each or a combination of the three change types, suggesting a causal relationship with the different types of organisational (change) behaviour. As was mentioned in the early findings, this differentiation does not include the potential for firms to have regressed, that is to say, to become environmentally more reactive, over time. Hence, in the absence of supporting evidence from this sample, I only focus on the three types of positive change. Generally speaking, though, and consistent with findings from the US data (Chapter 6), for completeness a fourth category (perhaps called 'Less than inertia') should perhaps be included in all future models and studies.

Figure 48 summarises the motivations for change. Although the reasons, motivations and benefits of environmental management resemble each other strongly across the three groups, it is the existence of much greater marketing and ethics based drivers that differentiate firms that have changed from those that have not. Reputation, image, and PR concerns are more widely represented among the changing firms, as are ethical considerations towards upholding 'a licence to practice'. Simultaneously, changes in stakeholder pressures over time tend to be to some degree mixed and causality not unequivocally determinable. Broadly, though, firms that displayed inertia in their environmental responsiveness have witnessed increasing pressures, whereas firms with the biggest changes reported stakeholder pressures to be diminishing or only modestly increasing. At the same time, these firms in group 3 are also impacted by the most comprehensive set of macro-economic factors. And while the non-changing firms are facing the biggest threats towards survival during times of the current economic downturn, firms in groups 2 and 3 appear to be continuing with environmental management through their EMSs. In the short run, however, firms in group 3 will likely to be slowed down in their efforts to make environmental performance improvements and will then resemble more strongly firms in group 2. Striking is also the fact that, firms in groups 2 and 3, unlike

firms in group 1, are more likely to anticipate a growing significance of environmental management in the future.

Faced with such varying needs and perceptions of pressures for organisational change, it is remarkable to observe how differently change is being initiated and driven among the three groups. The findings from the survey about the influence of individuals and change are summarised in Figure 49. While firms in group 1 do obviously not involve their low-level employees in their environmental strategies, the key difference between firms in groups 2 and 3 is the slightly different effect of changes driven from the low level employees and those by senior management. Firms in group 2 rely on the assistance of low-level employees in making those changes, while those in group 3 rely on the assistance of senior management support in addition to everyone else. Meanwhile, though, individuals within all three groups have largely not changed their views with regard to environmental management over time. The biggest difference, nonetheless, is the contribution that the respondents feel they can or are making to the overall business. In groups 2 and 3 several candidates attest that over the years they have become much more valued and respected in their firm's operation and that this has had positive effects on the way environmental management was being perceived and practiced. It is also within these two groups of changing firms that more respondents cited the 'cross-pollination' of ideas and values between their private and work lives.

Figure 48: Summary table for 'motivations for change' by change type

		Motivations for change				
		Reasons, motivations and benefits of environmental management	**Changes in stakeholder pressures**	**Impact of macro-economic factors**	**Impact of current economic situation**	**Future outlook of Environmental Management**
Change type	**1 - Inertia**	Variety of drivers and benefits, mainly cost savings, compliance with legislation, retaining and winning new customers	Increase from government & shareholders, big increase from employees that in 2008 matches the levels of the other groups; all other pressures decreasing	Corporate tax rate biggest impact followed by interest rates. House prices smallest impact	Compliance, survival, cutting costs and reducing and avoiding expenditure, firms don't realise financial benefits from EM	No change
	2 - Gradual improvement	Variety of drivers and benefits, mainly cost savings, compliance with legislation, retaining and winning new customers, marketing, ethics	Decrease from government, employees and local community. Had among the highest average levels of stakeholder pressures in 2006. Slight increase from customers and shareholders	Oil prices biggest impact. House prices smallest impact	Compliance, survival, cutting costs, from no to huge impact, consolidation, no impact on EMS implementation, finding more efficient ways of achieving goals, raised importance of effective EM, only short-term impacts, EM part of business, a catalyst for change in business model	No change or increase in focus and intensity
	3 - Significant change	Variety of drivers and benefits, mainly cost savings, compliance with legislation, retaining and winning new customers, marketing, ethics	Decrease from environmental pressure groups and local community, had among the highest average levels of stakeholder pressures in 2006, all others slightly increasing	Stock market indices biggest impact, closely followed by oil prices and business sentiment. House prices smallest impact. Price of carbon biggest impact of all 3 groups.	Compliance, survival, cutting costs, all budgets partly on hold, carry on recycling and saving money, focus on green credentials, EM more important than ever, some have not (yet) noticed any effect on EM	No change or increase in focus and intensity

Finally, with respect to firms' ability to change (Figure 50), again several distinctive characteristics of the three groups become evident. Similar to the changes in stakeholder pressures (Figure 43), the increasing degree of change between the groups is accompanied by an inverse trend of decreasing barriers over time. Whereas firms that have not changed their environmental management have perceived the greatest increases in barriers and obstacles and are therefore struggling the most, firms in group 3 appear to be least affected and claim that the barriers towards efficient environmental management have all decreased. Meanwhile, only firms that have changed (both groups 2 and 3) also report growing numbers of certified EMS implementation. Equally, the level of integration that environmental management enjoys with other functional strategies and practices is reflected in firms' change behaviour. In many cases, the more firms have changed, the more likely they have also integrated environmental management more widely within all of their business functions. Generally, however, firms are frequently struggling or neglecting to integrate environmental management as exemplified by the many firms in all three categories where integration has not occurred or is minimal. Finally, with respect to firm characteristics it would appear that, due to the unbalanced sample distribution, large firms are to a great extent represented in all three different change groups. Within this classification of large companies (250 employees and bigger), however, there are differences in the sense that firms in group 1 are on average significantly smaller both in terms of number of employees and turnover in comparison with the two other groups. Industry sector specific variation does exist but is likely to be statistically insignificant given the relatively small sample size.

Figure 49: Summary table for 'individuals and change' by change type

		Individuals and change		
		Driver of environmental management	**Change paths**	**Change in personal views & contribution of the individual**
Change type	**1 - Inertia**	Respondent	Predominantly middle-outward and top-down	Largely no change; cynical and frustrated with lack of government help or corporate support, sceptical with respect to effectiveness; respondent the lone voice of environmental issues
	2 - Gradual improvement	Respondent	Predominantly middle-outward and top-down assisted by bottom-up	Largely no change; mutual diffusion of environmental values between work and private lives; cynical and frustrated with lack of government help; continued learning through the role, evolution of views; advocate of the environment; live and breathe EM; respondent more valued and supported by the firm; more aware and involved; more bureaucracy; more economic view; environmental view has been confirmed
	3 - Significant change	Respondent	Predominantly bottom-up and middle-outward assisted by top-down	Largely no change; respondent becoming valued contributor to the business; mutual diffusion of environmental values between work and private lives, job roles and EM emphasis has intensified, respondents becoming more aware and involved, also seeing the business benefits

Figure 50: Summary table for 'organising for change' by change type

		Organising for change			
		Changes in barriers and obstacles	**Trends in certified EMS implementation**	**Integration of environmental management**	**Firm characteristics**
Change type	**1 - Inertia**	Increase in all barriers, particularly lack of skilled human resources and financial resources. Only lack of clear regulations decreased.	No change	Not at all or very limited extent. Mainly with health & safety and quality.	Firm size distribution reflects that of the sample, i.e., large firms are disproportionally more represented. Engineering firms and retailers in the majority. Firms substantially smaller by average turnover and number of employees.
	2 - Gradual improvement	Increase in lack of senior management support and financial resources. Other barriers remained stable.	Increase in number of ISO14001 implementations	Varying levels, from not at all to total integration. Integration with a multitude of other functions. Mainly operations, marketing, or driven through corporate strategic plans. ISO 18001.	Firm size distribution reflects that of the sample, i.e., large firms are disproportionally more represented. Electrical firms followed by engineering and transport firms in the majority. Firms substantially bigger by average turnover and number of employees.
	3 - Significant change	Almost all barriers decreased, of which lack of demand for green products and senior management support decreased the most. Lack of financial resources and technological solutions available increased slightly.	Increase in number of ISO14001 implementations	Varying levels, from not at all to strong integration. Mainly with marketing, new product design, quality and board level decisions.	Firm size distribution reflects that of the sample, i.e., large firms are disproportionally more represented. Retailers followed by food & drinks and chemical firms in the majority. Firms substantially bigger by average turnover and number of employees.

In summary, then, and consistent with the theoretical framework and findings from Chapter 6, firms appear to display different types of (change) behaviour in their corporate environmental strategy over time. As suggested by the literature, and more importantly, as self-reported by respondents, patterns of inertia, gradual adjustments as well as more significant large-scale changes seem to have emerged among the population of different firms in this sample. The main difference between firms in groups 2 and 3, however, is mainly the size of change over the same period of time. While environmental responsiveness in both groups of firms appears to have increased steadily over the last three years (there was no mention of a single 'trigger event'), firms in group 3 describe this change as much greater compared to firms in group 2. Thus, by extending the time frame to beyond the one applied in this research, changes within firms in group 3 would appear as being more sudden and large-scale in their character. This result, despite being only of qualitative nature, corroborates complexity theorists that have advanced the idea that different types of change patterns can co-exist within a population of firms. This stands in stark contrast to advocates of inertia and pure gradualism theories. Even if corporate environmental strategy solely represents one determinant of a firm's fitness and thus does not constitute organisational behaviour in its entirety, the variety of change patterns and the overwhelming number of facts support the conceptualisation of firms as fitness-seeking complex adaptive systems. More importantly, the evidence of this survey strongly corroborates the notion that firms attempt to satisfice their systemic fitness of *both survival and profitability*. Repeatedly, though, the differences in characteristic group behaviour are mainly manifested between firms that have changed and those that have not. The two groups that have both changed to a different degree are perhaps more alike than the comparative 'inertia group 1'.

As suggested by the theoretical discussions earlier, there are three factors involved as necessary preconditions for organisational evolution. Firstly, there must be the need, or strong enough motivations for change, which significantly depends on agents perceiving and interpreting their firms' fitness landscapes and anticipating its future development. Such acts of perception and interpretation rely not only on an individual's personal skills and knowledge, but also to a great extent on their tendency to interact with other agents across all levels of the organisation. Specifically, the greater the empowerment of low-level employees to meaningfully contribute to the firm's environmental responsiveness, the greater the chance that organisational changes do occur. This corresponds well with normative implications of strategy in turbulent environments raised in the existing literature (Mason, 2008). In addition, personal values and attitudes are certainly of great

relevance, but it is also the constant interaction with their extra-systemic environment, which allows agents to create meaning for their work and thereby influence their own behaviour. Lastly, these necessary preconditions are moderated by the system's ability to change. This moderating factor is determined by the organisational structure and its context as well as a variety of factors facilitating and impeding change.

In contrast to the previous chapters that solely relied on quantitative evidence, Chapter 8 has brought to light some of the (qualitative) details behind organisational change as part of the evolution of corporate environmental strategy. Therefore, the results corroborate the proposed theory of firms as fitness seeking complex adaptive systems where aspects of all three factors are supported leading to (relatively) distinctive (change) behaviours. More specifically, changes in corporate environmental strategy appear to depend on a variety of factors that are best characterised through the theoretical framework suggested in this research.

Most important to acknowledge from a policy perspective is the fact that UK firms in this sample have undergone a largely positive development over the course of the last three years with regard to environmental management. Nevertheless, serious questions and concerns remain regarding the full impact of the current economic downturn. Only time will tell. In addition, the persistent lack of regulatory planning certainty and general government support as well as an unsatisfactory waste recycling infrastructure are worrying trends that seem to have endured the course of the three years under observation. Government and regulators are advised to note these shortcomings and improve on these areas to achieve better environmental performance in future.

For companies these findings suggest that understanding the three factors underpinning changes in corporate environmental strategy is vital and could potentially ease their concerns during the looming times of economic hardship and positively contribute to their fitness function. As suggested by the research, individuals are key drivers in enabling improved environmental performance. Therefore, facilitating all employees' work with regard to environmental management is likely to have positive economic side effects that transcend environmental protection. Senior and environmental managers thus ought to raise their employees' awareness of the environment through training courses, which would stress how being responsive to environmental issues directly and indirectly impacts the firm. By the same token, the research also uncovered that this may indeed be easier for some firms than others. Given a lack of stakeholder pressures and financial resources,

some firms will continue to struggle to achieve changes in environmental management performance.

The longitudinal survey in this study has underlined the significance of individuals in the intra-organisational initiation and transmission of organisational change. Future research might therefore include multi-level case studies and questionnaires that seek to study these change paths in more detail. Given the complexity theory based foundation of this study, perhaps a network analysis exploring the connections between different agents in an organisation may help to uncover in how far certain 'key agents' are vital in the transmission of such change behaviour. Another interesting aspect of this survey was the notion of ethics-based motivations for the implementation of an environmental strategy. Interviews with managers in such firms could aim to study in how far such motivations are purely ethical or may in fact disguise a more enlightened attempt of guaranteeing organisational survival.

8.5 CHAPTER SUMMARY

Based on 55 repeated semi-structured interviews with UK companies, Chapter 8 has studied the longitudinal development of environmental management practice in British industry. Its findings suggest that three different types of change patterns have emerged over the last three years, with some firms not changing at all while others have changed steadily or even more significantly in positive directions. More importantly, motivations, individuals and contextual factors appear to have influenced this emergence of different change patterns. In particular, the role of committed and empowering environmental managers and co-ordinators has been highlighted as one of the key enablers of organisational change. To that end, this research has corroborated the general thesis conceptualisation of firms as fitness seeking complex adaptive systems. The following Chapter 9 will revisit the findings of all four empirical chapters and evaluate them in light of the conceptual development as outlined in Chapter 3.

CHAPTER 9: SUMMARY AND DISCUSSION OF RESULTS

9.1 INTRODUCTION

Chapter 9 revisits and summarises the findings from the empirical Chapters 5 to 8 and discusses them in the context of the research questions and propositions developed in Chapters 1 and 3. Moreover, this chapter explores in how far limitations and delimitations as part of the empirical work may have affected this research and may need to be taken into account during the interpretation of the results. Finally, this chapter sets the background to the following conclusions in Chapter 10 by preparing an assessment of the contributions of this research. Broadly, Chapter 9 has the following three aims:

- To summarise the empirical findings from Chapter 5 to 8 and assess in how far the research questions from Chapter 1 have been answered;
- To juxtapose these findings with the research implications and propositions developed in Chapter 3 and thereby evaluate the validity of the conceptual development;
- To discuss limitations and delimitations of this thesis.

Chapter 9 begins with the findings of this research by responding to the research questions from Chapter 1. Following that, I will discuss and evaluate the research propositions and comment on their usefulness in corroborating the conceptual development of Chapter 3. Two sections conclude by referring to limitations and delimitations of this research.

9.2 SUMMARY OF THE EMPIRICAL FINDINGS

At the outset of this thesis I have suggested that there is still a sizeable gap in our knowledge and theory about whether and how firms are changing their corporate environmental strategies over time. Despite a plethora of cross-sectional research, to date very little is known about the longitudinal development of companies' responsiveness towards environmental issues. This thesis has aimed, among many other things, to shed light on this deficiency.

9.2.1 RESEARCH QUESTIONS

Throughout the four empirical chapters 5 to 8, I have addressed the list of research questions in an attempt to describe, explain and predict as best as possible the evolution of corporate environmental strategy. Owing to its complex nature, the disagreements on whether to study this phenomenon at firm or population level, and the difficulties with operationalising and measuring the dependent variable, this summary and discussion of the

findings take on a more qualitative character of assessment. Nonetheless, I will address the research questions individually by combining the findings from the different empirical chapters. Starting with the key question,

1. What is the general long-term trend of corporate environmental strategy across a population of firms?

The results from Chapter 6 (and Chapter 7) have suggested that, for large US companies, between 1991 and 2004 there was an overwhelming absence of change in terms of corporate environmental strategy. Whenever changes did occur, they were mostly small in size and could be in both positive and negative directions. For the years 2005 and 2006, however, a growing number of bigger positive changes began to infiltrate the population in addition to more incremental changes. Even so, a large number of firms still did not change. Interestingly, these trends appear to exist regardless of whether the sample consisted of a changing or a fixed population of firms. Therefore, the observed change (and its absence) was not the result of a changing composition of leading American companies among the population, but rather the direct effects of firms making (no) changes themselves.

Chapter 8, by contrast, investigated the long-term trends among British firms between spring 2006 and winter 2008. In this case, despite using a completely different way of 'measuring' change, the emerging picture was slightly different. More specifically, while I again observed that about a fifth of the sample firms did not change over time, the majority of firms appeared to have made mostly incremental and positive changes. Additionally, about a quarter of firms even suggested to have made significantly positive changes over the three-year period, whereas no negative changes could be recorded.

2. Do firms become more or less proactive, or do they stay the same over time?

With respect to the environmental strategy classifications (Roome, 1992, Sharma, 2000) then, for large parts of the data companies appear to be predominantly 'reactive' in their posture. Chapter 5 gave an insight into such firm behaviour by highlighting the prevailing efforts to use environmental management as a means of cutting costs and complying with legislation and regulation. Nevertheless, there is a growing trend towards more firms becoming more 'proactive' in their environmental strategy stance over time. Chapters 6, 7 and 8 have indicated that greater 'proactiveness' is becoming more prevalent among the

different samples of firms. Still, a significant number of firms do not change over time. Equally, profiles of individual firms have suggested that firms frequently display a strong tendency towards 'reactive compliance' in the sense that even if they have made more positive changes, they are often subsequently being reversed (whether deliberately or not) (Chapter 6).

3. Are change patterns dependent on particular years or a particular epoch?

What is becoming apparent, though, is that a slightly more positive trend towards rising numbers of firms with more proactive environmental strategies appears to start in 2005 for the US data (Chapter 6), and equally, there is generally a positive shift among firms in the UK sample between 2006 and 2008 (Chapter 8). This suggests that the evolution of environmental responsiveness is not set in stone but dependent on particular periods of time. Assuming for a moment that the US and UK sample firms are generally comparable and subjected to similar socio-institutional trends, this might suggest that the UK data picks up from the recent trends in the US data so that roughly as of 2005/2006 the general fitness landscapes of firms both in the US and the UK changed sufficiently to the extent that some firms in both countries had to/decided to change (see 'Delimitations', Chapter 9.5).

4. How do these findings square with theories of inertia, incremental and gradual adjustment, and sudden, radical changes?

As discussed in questions 1 to 3, it appears that for long periods of time, relative inertia is a strong force as part of organisational behaviour with respect to the corporate environmental strategy. However, it is not the only pattern of evolution found in this research. Firms *can* and *do* change, both incrementally and in bigger steps. Given this broad classification, the findings have indicated that different organisational change patterns can exist concurrently among a population of firms, and even sequentially within the same firm (Burgelman, 1991). The wider implications for the different theories of change behaviour will be discussed in Chapter 10.

5. On the macro-level, how do different individual firms within a population evolve in terms of corporate environmental strategy?

As suggested above, changes in corporate environmental strategy can be in both positive *and* negative directions (Chapter 6), although recently changes have become predominantly positive in direction (Chapter 6 and 8).

6. Do all firms display the same or different (change) patterns?

While generally speaking different firms tend to display different change patterns/profiles – there is not one solitary change pattern across a population (Chapter 6 and 8) - some firms appear to follow identical or at least similar (change) patterns.

7. In how far do similarities among firms exist in terms of (change) patterns of corporate environmental strategy?

These similarities obviously depend on the operationalisation of corporate environmental strategy in the research as well as the time frame under observation. Broadly, it appears that firms with similar change patterns share similar motivations to respond to environmental issues (e.g., stakeholder and economic pressures, future prospects of environmental management) and contextual factors, such as the implementation of environmental management systems and barriers towards more effective environmental management. Likewise, the role and influence of (key) individuals within the different change patterns equally appears to play a role in whether and how much firms change over time (Chapter 8).

8. Are similarities dependent upon industry sector and/or firm size?

As part of the contextual factors, to some extent industry sector and firm size also contribute or hinder more proactive environmental management (Chapter 5, 7 and 8). However, this extent is difficult to define, for example, not all industry sectors appear to matter (Chapter 7). Broadly speaking, though, bigger firms are more likely to display (greater) change behaviour (Chapter 7 and 8). Often, firms of similar size and from the same industry sector share similar motivations and barriers but the exact effects of the 'ordering effect' of firm size and industry sector are less well discernible.

9. What are the particular drivers of organisational change with respect to corporate environmental strategy over time? Do they reside at field- or at macro-level?

Chapter 7 has suggested that the field-level factors oil prices and interest rates have a significant impact on changes in corporate environmental strategy unlike the macro-level factors environmental shareholder resolutions and R&D intensity. While interest rates had a more enduring impact over time, oil prices only gained in significance after they reached a certain level (2002-2006). At the same time, other macro-economic factors appear to be of significance as well in stimulating changes in environmental management. And although the price of carbon has not yet reached a level of significance, many firms expect it to do so very soon (Chapter 8).

10. What contribution do particular individuals make towards organisational change with respect to corporate environmental strategy?

Chapter 8, and Chapter 5 to a lesser extent, have suggested that all individuals can have a great impact upon the evolution of corporate environmental strategy. While environmentally concerned individuals often only represent the lone voice or advocate of environmental issues, those with formal responsibility (for instance, environmental managers or directors) can act as key initiators and drivers of organisational change. Frequently taking on the role as coordinators, they can empower low-level employees to make suggestions and forward ideas, and they have also been suggested to be 'the single most important reason for a more proactive progression of environmental management' in their respective firms.

At the same time, there is evidence to suggest that individuals get increasingly influenced by social trends in their non-work environment and vice versa, which in many cases leads to some form of 'cross-pollination' of ideas. And yet, many individuals do not think that their views have changed regardless of the evolution of their companies as a whole. While some individuals responsible for environmental issues in their firms perceive their role as just another job, many, especially in the more significantly changing firms, state that they feel they have become more valued by the company over time and that they in return feel better about their jobs and the contribution they can make.

11. In how far is this organisational behaviour top-down, middle-outward or bottom-up driven?

Chapter 8 has suggested that all levels have a role to play in organisational behaviour with respect to corporate environmental strategy. However, in those firms that have changed

more significantly, middle and low level employees initiate, organise and implement changes in environmental strategy, and are only assisted by top-level managers through organisational vision, goals and resources. By comparison, in firms that did not change, all attempts to initiate change are driven mostly by senior management only.

12. What other conclusions can be drawn about how environmental strategy contributes towards corporate strategy?

Finally, Chapter 8 attempted to gain an understanding of whether corporate environmental strategy can make a contribution towards firms' general strategy. The findings indicate that this contribution varies from firm to firm, and that it can be in financial form, or not. Often contributions can have a range of other benefits that do not appear to be directly measurable but which appear to be worthwhile nonetheless in that they directly or indirectly aid with efforts to ensure organisational survival. Judging by the comments of the respondents in Chapter 8, corporate environmental strategy has mainly gained in significance towards corporate performance over the years due to its perceived direct benefits of reducing costs and improving businesses processes, especially during times of economic hardship. Generally, the contribution is measured and depends on the scale of investment and the payback time that is required. Most firms (at least the ones that have changed over time) expect their environmental strategy to remain of significance for their businesses in the foreseeable future, if not even to increase.

9.2.2 OTHER FINDINGS

Worryingly, some barriers towards greater environmental responsiveness in UK firms, especially a lack of government support and a poor waste infrastructure, appear to persist in time. Both in 2006 and in 2008, respondents of the telephone surveys (Chapters 5 and 8) lamented the lack of incentives, government support and policy planning foresight with regard to facilitating environmental management practices as well as placing British firms at an unfair disadvantage in comparison to some countries in the EU and further abroad. Frequently, these barriers may give the strongest explanation for why companies have not been able to change their corporate environmental strategy over time.

At the same time, Chapter 6 indicated that for the balanced sample of companies KLD's environmental strengths A (beneficial products), C (recycling), D (clean energy) and G (environmental management system) have been the key contributing reasons factors for the

comparatively bigger increase in environmental strengths over the last two years 2005 and 2006. On the other hand, occurrences especially of environmental concerns B (regulatory problems) and D (substantial emissions) have risen more substantially over the years compared to all other concerns and thereby substantially explain the long-term gradual rise in concerns. Thus, while firms have been able to draw on proactive measures for improving their corporate environmental strategies, they have equally been held back by growing environmental concerns, possibly due to regulations that are either tightening or pollution benchmarks that are invariant to corporate growth.

9.3 ASSESSING THE CONCEPTUAL DEVELOPMENT

9.3.1 RESEARCH PROPOSITIONS

With reference to these empirical findings, I am now going to assess in how far I have found support for the research propositions developed in Chapter 3. As indicated in Chapter 1, due to the paucity of empirical literature on the evolution of corporate environmental strategy, this thesis therefore has, at least to some degree, a more exploratory character. Equally, in acknowledgement of the absence of clear extant theoretical foundations with respect to the topic as well as its complex circumstances, the scientific inquiry in this thesis is necessarily less hypothesis-driven and instead follows an approach whereby only general research propositions are validated and tested. In addition, given the partly qualitative nature of this research, the subsequent assessment of those propositions can mostly only be in broad, qualitative terms, rather than through specific statistical significance testing. In spite of that, in the following assessment of the research propositions, I will attempt to draw on both quantitative and qualitative measures employed in this research and thus aim to corroborate or reject the statements.

> ***Proposition 1:*** A cross-industry population of firms will become more proactive in its environmental strategies over time.

Findings from Chapters 6 and 8 corroborate this statement. Although for long periods of time the majority of firms have not changed, towards the end of the sample period in Chapter 6 (2005-2006), and the period 2006 to 2008 in Chapter 8, across the multi-industry populations of firms proactive environmental strategies have become more prevalent.

> ***Proposition 2:*** Different firms within a population evolve through and thus display individually different (change) patterns with respect to environmental strategy.

Again, findings from Chapters 6 and 8 corroborate this statement. There is not one solitary change pattern across a population of firms other than the general trend as witnessed in Proposition 1. Different firms display individually different change patterns, even if many firms resemble one another, particularly those that do not change at all over time.

> ***Proposition 3:*** A firm's industry sector and size have significant impacts on the evolution of its environmental strategy. The role of each factor in affecting patterns in environmental strategy is subject to an 'ordering effect' with industry sector being of greater significance than firm size. Combinations thereof are subject to the same hierarchy.

This proposition is contested in so far as that, although both industry sector and size are clearly of importance in influencing change patterns, the degree to which this is significant is less obvious and depends on other variables. Firms in similar industry sectors (Chapters 5, 7 and 8) and of similar size (Chapters 5, 7 and 8) appear to behave in a similar fashion. And while size appears to be statistically significant, only some of the tested industry sectors do so, too. While there is therefore some agreement in support of this statement, the evidence, particularly with respect to the ordering effect appears to be less well substantiated in order to fully support it, and thus only partially corroborates the theory.

> ***Proposition 4*:** Over time, more environmentally proactive strategies are positively related to increasing fitness payoffs anticipated and realised from such strategies.

Chapter 7 has attempted to illustrate statistically that changing fitness payoffs are the result of changing field- and macro-level factors that in return influence the change behaviour in terms of corporate environmental strategy. The findings from Chapter 7 suggest that field-level factors oil prices and interest rates have a direct and significant effect upon the evolution of corporate environmental strategy. In similar terms, results from Chapter 8 have suggested that firms that have positively changed are in fact driven to such behaviour as a result of a variety of motivations, which can be of both economic nature and not, and which thus aid 'satisficing' organisational fitness. Therefore, Proposition 4 is corroborated.

> ***Proposition 5*:** Individuals at all levels of the organisation play a key role in initiating and affecting a firm's environmental strategy over time.

Proposition 5 finds some support as part of the results from Chapters 5 and 8. However, due to the qualitative nature, this is very much dependent on the research characteristics and interpretation of the results. As such, they corroborate the statement but cannot be statistically verified. Therefore, Proposition 5 is partially accepted.

> ***Proposition 6:*** Firms are trying to find the optimal contribution that an environmental strategy can make towards satisficing organisational fitness by integrating it to the degree that best suits this cause in their particular fitness landscape.

The last proposition mirrors the findings of the previous proposition in that it again in part relies on qualitative evidence. Results from Chapters 5, 7 and 8 suggest that the contribution an environmental strategy can make towards organisational fitness depends on the firm's individual circumstances as well as the particular time period and hence its fitness landscape. This contribution varies in that it can be both financial and not. At the same time, an environmental strategy is integrated into other functional strategies to varying extents and thus reflects its particular needs. In essence, environmental strategy forms one part of many elements that together contribute to a firm's fitness. Therefore, Proposition 6 is partially corroborated.

Figure 51, below, summarises the verdicts reached on all six propositions of this thesis.

9.3.2 GENERAL ASSESSMENT OF THE CONCEPTUAL DEVELOPMENT

Given the absence of a suitable theoretical background for the longitudinal development of corporate environmental strategy with exception of a few static and partial models, the conceptual development of this thesis (Chapter 3) had two major aims. First, it attempted to describe a theoretical organising framework, a sort of 'world-view', of the firm and its environment as applied to the context of general corporate strategy, which would synthesise existing theories and elaborate a coherent understanding of what the term 'strategy' actually means and represents. Based on complexity theory, I have argued that strategy refers to the actions and interactions of individuals within an organisation that lead to patterns of behaviour over time. This discernible behaviour is only in part the result of intention and leadership by senior management, and it includes a vast range of outcomes from political, competitive and cooperative interactions among all agents and with their environment. These interactions are essentially designed to satisfice local and global

fitness in a changing fitness landscape. The emerging organisational (and thus implicitly operational) behaviour subsequently represents what is commonly referred to as 'strategy'.

The second aim of the conceptual development was to apply this organising framework to the specific context of the evolution of corporate environmental strategy based on the concept of 'rugged fitness landscape'. In this conceptualisation, environmental strategy forms a key sub-part of corporate strategy in that its efforts are designed to contribute to a firm's overall fitness. This organisational fitness has been defined as firm's general objective, or better its necessity, to make a profit and to survive, with the emphasis placed on the existence of both elements concurrently. In other words, depending on a firm's changing fitness landscape, corporate environmental strategy needs to be adjusted in order to guarantee survival and to improve profitability.

The propositions deduced from this conceptualisation and designed to address its validity have been either fully or partially corroborated in the preceding section and therefore lend strong support for the conceptual development outlined in Chapter 3. More succinctly, the findings have suggested that firms do indeed adjust their environmental strategies when inertia would either threaten their survival or might compromise their ability to maintain and increase profitability. Similarly, quantitative and qualitative results have indicated that the organising framework of the emergence of corporate strategy has been corroborated, thereby giving credence to the suitability of complexity theory in this context. In the following Chapter 10 I discuss what direct contributions these findings make towards extending a variety of theories, what their implications are for practitioners, policy makers and other stakeholders as well as suggesting a range of opportunities for future research designed to build on these findings.

Figure 51: Summary of verdicts for research propositions

Proposition		Evidence	Verdict
1	A cross-industry population of firms will become more proactive in its environmental strategies over time.	Quantitative evidence, Chapter 6 Quantitative evidence, Chapter 8	Corroborated
2	Different firms within a population evolve through and thus display individually different (change) patterns with respect to environmental strategy.	Quantitative evidence, Chapter 6 Qualitative evidence, Chapter 8	Corroborated
3	A firm's industry sector and size have significant impacts on the evolution of its environmental strategy. The role of each factor in affecting patterns in environmental strategy is subject to an 'ordering effect' with industry sector being of greater significance than firm size. Combinations thereof are subject to the same hierarchy.	Quantitative evidence, Chapter 5 Quantitative evidence, Chapter 7 Quantitative evidence, Chapter 8	Partially corroborated
4	Over time, more environmentally proactive strategies are positively related to increasing fitness payoffs anticipated and realised from such strategies.	Quantitative evidence, Chapter 7 Qualitative evidence, Chapter 8	Corroborated
5	Individuals at all levels of the organisation play a key role in initiating and affecting a firm's environmental strategy over time.	Qualitative evidence, Chapter 5 Qualitative evidence, Chapter 8	Partially corroborated
6	Firms are trying to find the optimal contribution that an environmental strategy can make towards satisficing organisational fitness by integrating it to the degree that best suits this cause in their particular fitness landscape.	Quantitative evidence, Chapter 7 Quantitative and qualitative evidence, Chapters 5 and 8	Partially corroborated

9.4 LIMITATIONS

In the following, I discuss which and in how far the limitations of the research methodology may impact the interpretation of the results. Research limitations arise as a result of decisions taken in the research design.

9.4.1 STUDY 1

Study 1 suffers from a number of limitations that are partly unavoidable, and partly may serve as the basis for future research. First of all there is the restricted industrial coverage. Although a stratified sampling approach was employed, the stratification method was based on whether an industry sector was likely to be exposed to environmentally problematic issues or not. Therefore, this first study only speaks to those sectors that are necessarily more affected and neglects those that may be comparatively 'greener' in their nature (e.g., banking and finance, professional services), but which nonetheless have increasingly come under pressure to incorporate environmental management into their strategies (Ruedo-Manzanares *et al.*, 2008). Apart from that, by drawing on a stratified sample in terms of industry, country and size, the aim was to circumvent some of the problems associated with an otherwise randomly selected sample. Alternatively, Study 2 attempted to address this shortcoming by studying a sample with firms from a much broader range of industries.

The next problem is firms' participation on the basis of having been invited by email. Thus, findings could have been shaped by self-selection biases to the extent that those companies already interested in environmental management or keen to get their voices heard were more likely to be willing to participate in this survey than others. By the same token, though, this would mean that in a world where such biases were significant, the conclusions of this study would likely to be strengthened by drawing the sample more widely.

Despite the best efforts to contact the most knowledgeable respondent within a company, I only ever spoke to one respondent per firm. The generalisability of the responses to represent views and processes of their entire companies is therefore heavily restricted and no assurance can be made that the respondent is in fact the most suitable candidate of the firm. However, given that this is the case for the entire sample, I would expect such drawbacks to be smoothed out across all firms. Additionally, the job titles listed give

reasonable confirmation that the respondents were to a great extent the best candidates for this survey.

An obvious limitation of surveys in the context of ethical issues is a certain degree of social desirability and affirmation biases; in other words, can we trust the respondent to tell the truth, and to speak without prejudice and pressure to conform to social and corporate agenda? As discussed in the methodology Chapter 4, a key strategy in this regard was the application of a mixed-methods data collection. By being able to contrast quantitative and qualitative responses, the purpose was to achieve a reasonable degree of objectivity and triangulation designed to countervail such biases. This entailed the use of open-ended questions and Likert-scales, which allowed respondents to answer with choice and free will. In addition, respondents were emphatically assured of their anonymity and confidentiality in participating in this survey. Nevertheless, a certain unwillingness to speak frankly when respondents' are being recorded is probably unavoidable.

In terms of data processing and analysis, limitations could have arisen through the employment of transcribers unfamiliar with the subject matter. But while this certainly posed problems particularly for transcribing acronyms and technical terms, it also ensured a degree of objectivity. Furthermore, the coding and interpretation of open-ended questions by only one person increases the risk of subjectivity. The obvious way to avoid such problems in a non-doctoral research project would be to have at least two people reading and coding the responses, which can then be compared and, if necessary, agreed upon with the help of a third person.

Finally, for a longitudinal study the key problem, as alluded to in Chapter 4, is sample attrition in the sense that respondents drop out over time for a variety of reasons. In order to overcome this problem substitute respondents had to be found, which for obvious reasons differ from their counterparts that participated twice. However, closer inspection of their responses revealed that first, substitute respondents formed part of all three change groups (thus eliminating the chance that they were a systematic problem with one particular change group), and, second, that their responses were not consistently different from respondents within their group, therefore giving assurance that their responses could be treated as equal with due consideration of their special status. As mentioned earlier, what could not be tested, however, was whether firms that dropped out of the second survey constituted an altogether different type of firm, particularly with respect to their long-term trends in environmental strategy. Perhaps these firms have made no or

significant negative changes over time which is why they refused to participate in the follow-up survey. Unfortunately, such reasoning can only be speculation. Finally, panel conditioning is another disadvantage of repeat interviews, 'whereby continued participation in a longitudinal study affects how respondents behave' (Bryman and Bell, 2003: 53). While this may have affected the research, many respondents claimed they could not even remember that they had already participated almost three years ago. To that extent, consistency in responding to Likert scale questions may have been the biggest concern.

More problematic, however, could have been the qualitative operationalisation of change in the context of corporate environmental strategy. This was based on respondent recall, which has obvious problems attached to it, such as the disentanglement of 'apparent' and 'true' change (Ruspini, 2002), and its subjective, emotional character. This would have therefore posed a serious risk for the subsequent classification and analysis of the interview data. However, this problem should have again existed throughout the entire sample, which therefore to some extent normalised such problems, and secondly, by applying quantitative measures in Study 2, a degree of triangulation was achieved.

To summarise, Study 1 entails a number of potential biases and research limitations. However, due to the complementary nature of Studies 1 and 2 and the fact that they may have existed consistently across the sample, one should be reasonably sure that their impact is of limited nature. Still, the interpretation of the results should be considered with due reference to these limitations but I believe that through the overall research design of the thesis they have been mitigated as best as possible.

9.4.2 STUDY 2

By contrast, the key limitations to Study 2 mostly revolve around the reliability of the data and the subsequent interpretation of the findings. First, despite its record as a useful source of data with respect to CSR and environmental management, KLD data have been the subject of considerable methodological debate (Mattingly and Berman 2006; Sharfman 1996). Essentially, these limitations relate to the operationalisation of corporate environmental strategy in Study 2; in how far is it possible and conceptually coherent to add up the different measures of environmental strengths and concerns (problem with additivity)? Questions also arise when using KLD data for determining a firm's environmental strategic behaviour that relies on relatively broad measures: Binary integers

are used to rate the different levels of strengths and concerns, and as such they do not give information about small-scale trends and changes made by the company. Another concern is whether KLD's threshold values are too big to capture significant variations in the categories. Future research could therefore refer to other data in order to triangulate in how far environmental strategies really are progressing.

Similarly important is the survivorship bias of the balanced sample. Continued presence of a company in the S&P500 broadly suggests continued success, which in most cases is accompanied by growth in size and turnover. However, along with such development potentially also come greater levels of environmental concerns if KLD's threshold levels have remained the same. Particularly since regulatory problems and substantial emissions are rising (as shown in the balanced sample; Chapter 6), this would suggest that companies are growing but are finding it difficult to keep pollution under control. Alternatively, threshold levels, particularly for environmental concerns such as pollution levels, may have been raised by KLD over time. In this case, the increase in concerns is not so much a result of firm growth, but rather firms' inability to keep up with tightening threshold values. The research thus cannot take these firm and data characteristics into account.

Further concerns relate to the choice of the S&P500 as the sampling frame in the sense that it includes the largest firms only. Accordingly, the data do not reveal anything about the wider trends of a full population of firms within an entire economy. To a degree, this concern is addressed in Study 1 by sampling from firms of all sizes. The research is also based on annual average values for oil prices and interest rates, which therefore do not reflect substantial intra-year variation. But given the annual character of the KLD data, this appeared to be the most suitable choice of data for this research. Future work may well want to look at trends over shorter intervals as well.

Statistical problems have arisen in the context of the dependent variable as it displayed a non-normal distribution. This concern was dealt with in the form of transforming the resultant dependent variable by reclassifying the data into ordinal data of three change groups. Again, some detail was lost in this process but given the non-normal distribution this provided the best solution.

Fundamentally, the limitations of Study 2 mainly refer to problems with the secondary data source. As explained in Chapter 2, though, at the moment KLD data present the only useful secondary data source for studying the evolution of corporate environmental strategy that

includes firms from all industries and not just the environmentally problematic sectors as in the EPA's TRI database. To that end, the choice of KLD data has resulted in shortcomings which are not avoidable for this research and which therefore need to be taken into account in the wider interpretation.

9.5 DELIMITATIONS

Delimitations are issues that relate to the wider scope and research design of this thesis and which place boundaries on its execution and interpretation. These delimitations have in part already been addressed in the methodology Chapter 4 but I will make due reference to several points that are of general importance. These delimitations will then be used in the following Chapter 10 in order to suggest viable pathways for future research that might address such problems.

The first delimitation posed by this thesis is the time frame for Study 1. While the period between spring 2006 to winter 2008 covers almost three years, a slightly longer time frame may have been able to uncover the full extent of the impact of the current economic crisis upon firms' environmental strategies. The question is therefore, has the lapsed period been long enough to be able to draw meaningful conclusions? As indicated in Chapter 5, environmental strategy policies are best considered in a three-year time frame, so to see the full effects, a slightly longer observation period would have been ideal. Alternatively, a third set of interviews may have been just as suitable, but there are serious concerns about the feasibility of such an undertaking given the growing attrition rate. Another issue with a longer time frame might also be that respondent recall of the changes is unlikely to improve with time.

With respect to the time frame under observation, the missing years 2007 and 2008 for the KLD data equally represents a shortcoming, which would have otherwise enabled even greater insights into the phenomenon studied. For instance, the results of Chapter 6 suggested that change was not the result of a changing composition of the population but was based on firms' adaptive behaviour. Given that most firms did not (need to) change at all over time, the extent to which selection forces operated at population level in this context therefore remained largely invisible. Assuming then that the discernibly more positive trend of 2005/2006 continued, data from 2007 and 2008 might have helped to better differentiate the effects of adaptation and selection forces and, at the same time, would have strengthened the other findings from Study 2 as well. However, this data was

not available at the time of the investigation and cost concerns as part of the thesis further restricted the realisation of such plans.

Another important delimitation of this thesis is the exclusive focus on the Anglo-American sphere, which severely restricts the interpretation of the findings to speak to other national systems. More specifically, despite Britain and the United States sharing many legal, social, economic and cultural traits, they still operate in slightly different geographical contexts (e.g., Britain and the EU). In comparison to other national systems such as the emerging and 'BRIC' countries, however, they are comparatively similar and therefore do not allow the generalisability on a more global scale. To a lesser extent, questions also arise as to whether the responses from British firms could be treated as representative of other EU countries as well. This therefore limits the results of this thesis to be globally generalisable.

With regard to the unit of analysis, it was also suggested earlier that the research in this thesis focuses exclusively on single organisations rather than firms as part of wider supply chain networks or strategic alliances. As such, the research only addresses the phenomenon of the evolution of corporate environmental strategy for individual firms in their entirety rather than extending the investigation into external strategic areas of development, or studying intra-firm behaviour differentiated by department over time. Given the amount of time and resources available this delimitation was based on a personal decision necessary to ensure the successful conclusion of this research project.

As was indicated in Chapter 4, many studies in the field of complexity theory have extensively relied upon the use of computer simulations in detecting emerging patterns (for example, Dooley and van de Ven, 1999; Fleming and Sorenson, 2001; Frank and Fahrbach, 1999; Levinthal, 1997; Rivkin, 2000). There is, nonetheless, a great deal of debate about whether such models can actually help with explaining and predicting causal relations in the 'real' social world, and they are therefore contested as a scientific means of testing theory (see Davis *et al.*, 2007). One of the aims of this thesis was therefore to expand research into complex adaptive systems by employing more traditional research methods as far as it was reasonable and possible (Beeson and Davis, 2000; Mason, 2007, 2008). As a result, the findings of this thesis are less quantitative and graphical in comparison with their simulation model counterparts. By the same token, they are based on empirical data and they therefore increase the external validity of the research.

Notwithstanding that, the potential insights gained from the application of computer simulation models in this context in future research should not be discredited.

As part of the methodological considerations, Chapter 4 has argued that by employing a mixed methods approach throughout this thesis and as part of Study 1, I have attempted to avoid the trappings of common method bias. Conversely, though, the findings have suggested that precise quantitative modelling in both studies might have improved the testing of the statistical significance of the results. On this basis, therefore, the use of this mixed methods approach results in advantages and disadvantages that future work may want to address.

Finally, the choice of the theoretical foundation necessarily limits and equally enhances the subsequent conceptual development and empirical research. Given the multi-faceted and complex nature of the research topic, choosing complexity theory enabled a unique and different insight in comparison to existing lines of enquiry within extant research (*cf.* Bansal, 2005; Lee and Rhee, 2007). But despite the theoretical and empirical contributions of the approach in this thesis, it is difficult to directly translate the findings of this research into previous analytical models and conceptualisations.

9.6 CHAPTER SUMMARY

Chapter 9 has summarised the empirical findings from Chapter 5, 6, 7 and 8 and assessed in how far the research questions from Chapter 1 have been answered. Furthermore, by juxtaposing these findings with the research propositions developed in Chapter 3 I have argued that these have all been either fully or at least partially corroborated. The findings of this thesis therefore lend strong support for the validity of the conceptual development, which perceives the evolution of corporate environmental strategy as the direct result of efforts to satisfice organisational fitness in a changing fitness landscape. Finally, limitations and delimitations of the research in this thesis have been discussed and provide some of the background for the following conclusions in Chapter 10.

CHAPTER 10: CONCLUSION

10.1 INTRODUCTION

This final Chapter 10 sums up the main approaches, findings and contributions of the thesis. It reviews the outcomes of the literature survey identified in Chapter 2, reiterates the key arguments proposed in the conceptual development of Chapter 3, and juxtaposes them to the findings of the empirical research in Chapters 5 to 8. Furthermore, drawing on these discussions Chapter 10 then elaborates the contributions of this research by extending existing theories as well as highlighting the implications for practitioners, public policy makers and other stakeholders. Finally, it suggests a list of valuable future research directions on the basis of this thesis. Chapter 10 has the following aims:

- To summarise the main approaches, findings and contributions of the thesis;
- To extend existing theories and outline the impact of the findings for scholars and practitioners;
- To develop opportunities for promising future research.

10.2 SUMMARY OF THE MAIN FINDINGS OF THE THESIS

In this section, I review the main findings and approaches of the thesis. This is done to summarise the contributions and to lay the foundations for the next section of extensions to theory.

The literature review of environmental management research published in leading management journals between 1990 and 2008 in Chapter 2 has argued that most existing empirical research has a primarily quantitative, cross-sectional character and a relatively narrow focus on particular countries and industries. At the same time, theoretical contributions are marked by disagreements between orthodox, static and partial conceptualisations on the one hand and more systemic and dynamic approaches on the other. Building upon this critical review of extant research, I have argued that there is a gap in the literature with regard to empirical and theoretical contributions towards understanding the evolution of corporate environmental strategy and in so doing I have justified the overall topic and direction of this thesis.

Building upon Chapter 2, Chapter 3 has reviewed the extant literature on the longitudinal development of corporate environmental strategy and argued that in order to understand and frame this topic, more general concerns with research on corporate strategy need to be

taken into account. More specifically, Chapter 3 has emphasised the ongoing debates about the definition and conceptualisation of corporate strategy and proposed that, given the generally static and partial conceptualisations of environmental strategy as well as a lack of understanding of the long-term processes in this regard, a more comprehensive and complete theoretical background is required. To that end, Chapter 3 has developed a coherent and widely applicable organising framework within which companies can be viewed as complex adaptive systems whose agents, endowed with skills and bounded knowledge, act and interact based on schemata designed to interpret the internal and external environment of the organization. These cooperative and competitive interactions enable agents to improve their local and global fitness and thereby bridge the gap between current and desired states. As a result of this complex behaviour, an organization's corporate strategy emerges. Further, I have suggested that environmental strategy is not a special case of general strategy, but rather reflects only one of many corporate strategy components that together determine a firm's fitness. By drawing on the organisational metaphor of 'rugged fitness landscapes', I have developed a dynamic and systemic conceptualisation of the evolution of corporate environmental strategy within which agents attempt to satisfice organisational fitness consisting of survival and economic profit. Finally, several research propositions have been elaborated with the aim to be exposed to empirical validation in the research chapters of this thesis.

Consistent with the deliberations in Chapters 2 and 3, Chapter 4 has described and justified the general methodology used for the research in this thesis. It outlined in detail the two studies and their respective sampling and analytical approaches for the relevant parts (chapters). In effect, this thesis relied on a multi-study, multi-methods and multi-level analysis of both primary and secondary data in order to investigate the phenomenon of the state and evolution of corporate environmental strategy. The choice of this particular research strategy has been justified on the grounds of benefiting from the complementary research characteristics employed in this study as well as the desire to best explore characteristics of complexity theory without having to resort to computer simulation models.

As a result, Chapters 5 to 8 and as summarised in Chapter 9 have provided evidence that the evolution of corporate environmental strategy is a phenomenon in which changes, or more precisely, a firm's strategy defined as organisational/operational behaviour (Chapter 3) emerges in a variety of patterns across a population that are both time and firm dependent. In other words, each firm displays a different evolution in terms of corporate

environmental strategy over time, even if many firms resemble one another due to a range of firm characteristics including industry, size, role of individuals and context. Equally, while there is broadly no change in environmental strategy over many years within a population, a slightly more positive accentuation exists from the year 2005 onwards. These evolutionary patterns in environmental strategy support the notion that the changes are the result of the combinatorial effects of different pressures and incentives in a changing fitness landscape and they are designed to satisfice a firm's fitness of survival and profitability.

Based on these findings Chapter 9 has argued that the research propositions developed in Chapter 3 have all been either fully or at least partially corroborated and that they, therefore, lend strong support for the validity of the conceptual development even though several limitations and delimitations of the research have to be considered in their interpretation.

10.3 CONTRIBUTIONS AND EXTENSIONS TO THEORY

This section is going to discuss in how far the empirical findings of this thesis contribute to and extend several strands of theory in the existing literature. I will start by discussing the direct impact of my results on the field of environmental strategy before expanding the horizon towards general theories of organisational change behaviour and complexity.

10.3.1 ENVIRONMENTAL STRATEGY RESEARCH

The research in this thesis has helped to fill the gap in the existing literature with regard to the evolution of corporate environmental strategy. By providing empirical evidence of longitudinal trends, it has complemented our knowledge of whether and how organisations change their responsiveness to environmental issues over time. Importantly, despite a handful of existing longitudinal research contributions, the thesis has shed light on the general trends among a large population of firms through research that is not restricted to a small number of firms operating in environmentally sensitive sectors (e.g., Bansal, 2005; Hoffman, 1999; Lee and Rhee, 2007; Rhee and Lee, 2003).

More specifically, it has illustrated that in spite of the significant increases in the salience of environmental issues for corporate managers, very little has changed for a long period of time. This result is certainly disappointing on the one hand but the findings have also highlighted how context dependent the importance of environmental management is. The

recent, more positive trends offer hope that more proactive changes are indeed possible, given the right pressures and incentives for firms to act and react. In accordance with the findings of Bansal (2005), Hoffman (1999) and Lee and Rhee (2007) research in this thesis has confirmed that different eras and thus, implicitly the associated economic, social, political, technological and legal conditions in particular, are important in influencing changes in environmental strategy. Likewise, it has suggested that under certain circumstances (read a particular fitness landscape), firms may not necessarily always proceed in positive directions only, contrary to commonly held beliefs (e.g., Berry and Rondinelli, 1998), and that evidently proactive environmental management is not always perceived as being beneficial by all companies (Aragón-Correa and Rubio-López, 2007; Christmann, 2000; Orsato, 2006; Shelton, 1994; Shelton and Shopley, 1996). More correctly, though, it has corroborated Winn and Angell's (2000) propositions that there may be different scenarios, or path changes, in corporate environmental management, although this research has avoided investigating and taking into account a firm's official rhetoric and policy commitment (Rhee and Lee, 2003). In other words, transitions between different types of strategies vary to the degree that they are generally different for different firms, even if commonalities exist across a population.

Research in this thesis has also addressed the neglect to study the importance of field-level macro-economic factors on changes in environmental strategy. I find evidence that oil prices and interest rates are key factors in shaping a firm's fitness landscape. Although the price of carbon has now in early 2009 almost collapsed due to the global recession, and therefore has a very limited or perhaps even adverse effect on corporate environmental strategy, many firms expect this to be a major factor in the future. In reality, however, a much greater combination of factors including societal trends and regulation have an impact on firms' behaviour at different points in time (Hoffman, 1999). This would also resonate with Bansal's (2005) findings, which highlighted the importance of the media, stakeholders and regulations in causing organisations to change and that the combination of causes varies over time. Firms must therefore find solutions to a variety of fitness problems of which their environmental strategy – linked with other functional strategies and attributes – contributes to this overall fitness function.

Rather than accepting the plethora of explanatory context variables enabling and constraining corporate environmental strategy, as exemplified by the many cross-sectional studies into the effects of pressures exerted by stakeholders (Buysse and Verbeke, 2003; Christmann, 2004; Fineman, 1996; Henriques and Sadorsky, 1999; Kassini and Vafeas,

2006), legislation and regulations (Fineman, 1996; McKay, 2001; Rothenberg, 2007), issues (Hoffman, 1999, 2005), resources (Judge and Douglas, 1998; McKay, 2001), the media (Bansal, 2005; Klassen and McLaughlin, 1996), capabilities (Sharma and Vredenburg, 1998), managerial discretion and responsibility (Aragón-Correa *et al.*, 2004), and competitiveness, legitimation, and ecological responsibility (Bansal and Roth, 2000; González-Benito and González-Benito, 2005) to name just a few, this thesis has approached the causal structure behind the evolution of corporate environmental strategy by conceptualising it as part of a systemic characteristic in the form of complex adaptive systems navigating rugged fitness landscapes. Although this approach loses the ability to make firm specific and detailed predictions, it allows the broader understanding of the general evolutionary process across a population of firms. Furthermore, it repositions and integrates environmental strategy into the wider organisational design and purpose, rather than treating it as a separate and comparatively insignificant part of corporate reality. Hence it has wide-ranging and normative implications which will be discussed in a subsequent section.

One area that is directly affected by the theoretical framework and empirical findings of this thesis are the important and ongoing debates about the link between environmental performance and financial performance (Clemens, 2006; Darnall and Edwards, 2006; Dowell *et al.*, 2000; Judge and Douglas, 1998; Nehrt, 1996; Russo and Fouts, 1997; Scharfman and Fernando, 2008), and share price trends in particular (Bansal and Clelland, 2004; Klassen and McLaughlin, 1996; Mathur and Mathur, 2000). While these studies seem to paint a slightly more positive picture of the environmental versus economic performance link a general problem with these studies is the determination of cause and effect, and especially the relevance of contextual and other unobserved but potentially highly influential factors. To that end, Ambec and Lanoie (2008) have attempted to summarise under which circumstances and in how far environmental protection might pay. The conceptualisation and findings of this research, however, have suggested that corporate environmental strategy need not necessarily 'pay' only in economic terms. Rather, the thesis has proposed that an environmental strategy contributes to satisficing organisational fitness, which also entails ensuring long-term survival; in this case such payoffs would only appear 'off the balance-sheet', so-to-speak. This may therefore explain why research efforts often detect no direct positive effects and why a broader operationalisation of the payoffs would need to be considered in all future studies. In equal measures, this thesis has suggested that proactive environmental strategies have started becoming more prevalent. In conclusion then, this might suggest that, with time, more and

more empirical studies will be finding stronger positive links between environmental and financial performance, given that evidently more firms value the fitness enhancing contributions of an environmental strategy. This logic also has immediate ramifications for the wider field of corporate social responsibility within which environmental research is often positioned. Continuing with the organising framework and the conceptualisation developed in this thesis, it would suggest that efforts undertaken by firms as part of their CSR strategy should equally be conceptualised and researched from a complex adaptive systems view, within which firms attempt to 'satisfice' profit *and* survival. In that respect, this thesis has laid the foundations for future studies that incorporate the theoretical background described in Chapter 3.

Another finding of the thesis is the significance of individuals and in this case environmental managers, in particular. Consistent with existing research (Andersson and Bateman, 2000; Branzei *et al.*, 2004; Cordano and Frieze, 2000; Ramus, 2001; Ramus and Steger, 2000; Rothenberg, 2003, 2007), the thesis has highlighted the need for 'boundary spanners' (Floyd and Wooldridge, 1997) to be able to mediate between internal and external selection environments and thus, to affect corporate strategy (Andersson and Bateman, 2000; King, 2000; Mason, 2008). Furthermore, the results have hinted at the differentiated effectiveness of 'top-down' versus 'bottom-up' driven initiatives. In accordance with prior research (King, 2000) top management initiates responses to external changes in an effort to preserve the *status quo*, which initially leads to relative inertia in terms of environmental responsiveness. This then, however, affects the deep structures, as witnessed by the greater involvement of low- and mid-level employees that cause organisations to gradually evolve to different structures and behaviours (King, 2000). In this sense, 'companies evolve through a series of stages – each of which is useful in advancing to the next' (King, 2000: 237).

Furthermore, the literature review in Chapter 2 has argued that most theoretical publications with respect to environmental issues and sustainability are characterised by a dichotomy of paradigms and can be classified as being either 'eco-centric' or more 'econo-centric' in their outlook. The distinctions between the two world-views can be summarised as follows: On the one hand there is the orthodox, static, and partial view, which is heavily economics-oriented and which perceives of environmental issues predominantly as business problems that can or should be addressed as opportunities for corporate growth and profitability. This paradigm often operates in isolation from wider social and environmental antecedents and consequences and only relatively direct linear relationships

of cause and effect are analysed. In contrast to this econo-centric perspective stands the eco-centric view, which is comparatively more dynamic and systemic. Core to its understanding is that economic aspects form only one part of the global system and hence that environmental issues must be managed within a much wider context of ethical responsibilities. In these contributions of systemic thinking, scholars debate the place of the corporation within the wider society and attempt to develop theories for radically new approaches to environmental management that involve a shift from the present paradigm's focus on internal, operational strategies to a more far-reaching concept of holistically integrating (ecological) sustainability into future organisational visions and decision-making. The question in the context of this thesis arises in how far the conceptual development and the resulting empirical findings can and should be classified as being part of either of the two paradigms.

In my opinion, the apparent chasm between the two paradigms exists mainly because of epistemological and ontological concerns with respect to what exactly it is the social researcher aims to do. Is it on the one hand the desire to describe, explain and predict human and social behaviour by detecting 'universal laws', if possible, or is the aim to understand human behaviour and change it according to one's own or otherwise derived normative understanding? Hence, is the conceptual development, as outlined in Chapter 3, more eco- or more econo-centric in its nature, and in how far does this affect its ability to assist (or perhaps inadvertently hinder) researchers, managers, and policy-makers with addressing and solving some of its toughest problems, in this case the protection of the environment? The question is therefore in how far do ethical consequences influence the usefulness and validity of the conceptual development and the findings of this thesis?

The reality is that the theoretical framework and conceptualisation cannot change human and organisational behaviour. They were developed on the back of a research agenda and the rational application and deduction of existing and emerging strands of theory designed to describe, explain and predict the evolution of social behaviour as best as possible. In its course, I have made the necessary assumption that, at least at the organisational level, all firm behaviour is ultimately subordinated towards attempting to achieve long-term organisational survival as well as maintaining and increasing profitability, regardless of individual agents' personal motivations; this thesis has been corroborated in this research. To that extent, the conceptualisation strikes a distinctively econo-centric chord, as it would appear to entirely neglect the natural environment in its workings. This poses the question of whether, by defining and understanding the purpose and mechanisms behind

organisational behaviour as is done in this thesis, it inevitably leads to a situation, which, as many claim, has exacerbated and ruined the natural environment in the first place? Is this simple assumption of the conceptual development an accidental conspirator in justifying harmful or at least solely compliant environmental strategies by accepting them as 'just the way things are'?

Personally, I believe that understanding the evolution of corporate environmental strategy, even if by means of a conceptualisation that, at least superficially, ignores the natural environment, I am in a much better and particularly more realistic position to offer advice to managers and legislators rather than by attempting to reverse-engineer it from a conceptual utopia. It is in this sense that I believe that the implications as drawn in the next section for practitioners and policy makers provides us with the biggest hope and opportunity to improve things in a way that acknowledges an, at least for now, prevailing organisational reality. This is not meant to denigrate eco-centric contributions, but rather to perceive of the conceptual development in this thesis as a useful and encouraging starting point from which perhaps more idealistic conceptualisations can be re-interpreted and applied to current organisational behaviour (See also, for instance, York, 2009).

Finally, returning to one of the starting points of the thesis – the definition of environmental strategy – perhaps a short addition may be suggested that incorporates the theoretical and empirical contributions of this research and which places it into the wider organisational behaviour and strategy context: 'The environmental strategy of an organization here refers to 'a pattern in action over time' (Mintzberg *et al.*, 1989: 27) intended to manage the interface between business and the natural environment … Environmental strategy refers to outcomes in the form of actions firms take for regulatory compliance and to those they take voluntarily to further reduce the environmental impacts of operations' (Sharma 2000: 682). *In effect, environmental strategy emerges and forms part of a firm's corporate strategy efforts by contributing towards satisficing organisational fitness of guaranteeing (long-term) survival, and maintaining and increasing profitability.*

10.3.2 ORGANISATIONAL CHANGE THEORIES

One of the objectives of the thesis was to shed light on the phenomenon of organisational change behaviour. As indicated in Chapter 6, a great variety of (often competing) theories exist that have been examined in a multitude of industrial settings. A key consideration in

these debates is whether to conceptualise the existence of organisational change either as the result of firms' incremental (Child, 1997; Cyert and March, 1963; March, 1981; Miles *et al.*, 1978) or large-scale adaptation (Gersick, 1991; Romanelli and Tushman, 1994), or alternatively, to perceive of firms as generally unable and unwilling to change (inertia) (Boeker, 1989; Hannan and Freeman, 1984; Miller and Friesen, 1984), and where changes among a population are purely the result of selection forces that screen for more favourable traits in a changing environment. The main argument is, therefore, one concerning the unit of analysis in the context of change.

As the results of this research have illustrated, at least with respect to one particular characteristic (corporate environmental strategy), firms are able to change and adapt (both positively and negatively), even if large numbers have not changed at all for a long period of time. This would support the notion that both adaptation and inertia theory can co-exist. Furthermore, depending on one's definition of radical change and the length of the time frame under observation, firms have also been noted to make comparatively bigger changes in their corporate environmental strategies. At the same time, the direct effects of selection forces have been less clear. One reason for that was, as mentioned earlier, the predominant lack of change among the population wherefore selection forces would have been unable to screen out unfavourable traits, in this case on the basis of a firm's environmental strategy. Whether or not selection forces become important in affecting the population of firms and thus favour more environmentally friendly firms may thus only become visible in the near future if the trends as witnessed from 2005 onwards continue.

Fundamentally, the findings of the thesis support the complexity theory idea that both adaptation and selection forces can act as 'interrelated drivers of organisational change' and that the different organisational change behaviour theories of adaptation and inertia are therefore not mutually exclusive as suggested by some scholars, (*cf.* Burgelman, 1991; Dooley, 1997; Kelly and Amburgey, 1991; Levinthal, 1991; Stacey, 1995). Important to remember in this context, however, is the fact that environmental strategy is only one of many contributors to organisational fitness. A more comprehensive analysis of a firm's corporate strategy, which includes environmental strategy and other attributes, may ultimately be more suitable for exploring the interrelated adaptation and selection forces.

Essentially, though, the debate relates back to whether to concentrate on the evolution of a population of firms as a whole, or of the evolution of a specific, individual organisation. To that end, the research has suggested that an individual firm can display different types of

behaviour throughout its life time, including no change, smaller and bigger changes; this is, effectively, a corroboration of both inertia and adaptation theories. This phenomenon is then reflected in the population as a whole, at least from the environmental strategy perspective, where different firms appear to display different types of behaviour. Consequently, however, the question of whether a population evolves as a whole, very much depends on which era and what length of time frame is chosen, whether one considers only the majority of firms with one type of behaviour to characterise this evolution or whether to include all observable types, and finally, whether this population consists of a varying, contemporaneously defined or a fixed and balanced panel of firms. These different aspects of defining a population, therefore, can have a direct influence on the conclusions that are drawn about the evolution of a population of firms as a whole. As a result, the thesis has advanced our general understanding of evolutionary trajectories by combining existing theories as part of a complexity theory inspired view of firms and their environment.

10.3.3 COMPLEXITY THEORY

Finally, the application of complexity theory in this thesis has helped with creating an understanding of corporate strategy, which draws on existing concepts and theories but also incorporates critiques of research in this area. To that end, it aimed to square the debates on whether to perceive of strategy as plans or outcomes, and as either the intended results of senior managerial implementation or of many unorganised 'bottom-up' interactions. When viewed through the lens of a complex adaptive systems perspective, the thesis proposed to conceptualise corporate strategy as a dynamic and systemic phenomenon. Dynamic in the sense that an organisation continuously co-evolves with its environment, and systemic in that strategy emerges as a phenomenon at organisational level, which is caused by the interaction of *all* of its agents (its parts) among themselves and with their environment. As such, it contributes to the debates on parts versus the whole. More succinctly, while understanding 'how' a system evolves remains thoroughly positioned within the classical reductionism research tradition, the thesis' approach for answering 'why' the system evolves has been shifted to the level of the emergent phenomenon of the 'whole' (Corning, 2002). This view obviously raises questions about predictability and how much influence senior managers generally can hold over the future of their organisation.

Essentially, though, by adopting this perspective the thesis has laid the foundations for the application of a more detailed conceptualisation as required for the topic. More specifically, it allowed the application and translation of a relatively well-used model for evolutionary processes: firms navigating their fitness landscapes. This model has helped with describing and explaining how and why firms have changed (or not) their environmental strategies in the past. However, being able to make individual predictions about evolutionary processes is a lot more difficult, if neigh on impossible. Nevertheless, the thesis provides a conceptualisation with an assumption of firms aiming to satisfice their fitness of profit and survival, which transcends the original topic of the thesis by allowing us to understand general organisational evolution in this way. It is in this regard that the thesis offers the most significant contribution to theory through the use of complexity theory.

Another contribution stems from the thesis' ability to integrate and consolidate existing contributions of longitudinal trends with respect to companies and environmental issues. In particular, it incorporates earlier research that drew on institutional theory combined with the resource-based view of the firm (Bansal, 2005; Lee and Rhee, 2007), and resource-dependence and institutional theories (McKay, 2001). In so doing, it provides a framework for existing and future research by positioning individual aspects of corporate environmental responsiveness within a much wider understanding of corporate strategy and organisational behaviour.

10.4 FURTHER IMPLICATIONS

10.4.1 PRACTITIONERS, PUBLIC POLICY-MAKERS AND OTHER STAKEHOLDERS

As suggested before, the conceptual development and the findings of this thesis have some wide-ranging implications for a range of stakeholders. For practitioners it firstly suggests that macro-economic variables have a significant impact on their environmental strategies. Thus, being aware of the general trends in oil prices, interest rates, and potentially the price of carbon is essential as they will not only affect the company itself but also its competitors. And while environmental shareholder resolutions have not had a direct statistical effect, the findings here cannot rule out that with intensifying shareholder demands towards greater transparency these pressures are only likely to grow and place bigger burdens upon firms to comply and adjust their environmental strategies.

Secondly, the research has indicated that environmental co-ordinators, who listen, provide incentives and empower (low-level) employees, have a crucial role to play in instigating and improving environmental responsiveness. Managers interested in addressing environmental issues in their firms should therefore aim to recruit or nominate individuals tasked with the responsibility to raise and encourage greater environmental awareness. This may entail considering approaches and procedures which aim to stimulate agents' interaction with one another and expose them to the natural and business environment by means of reduced hierarchies, discussion groups, field visits, and active engagement in their communities.

Normatively, the research suggests that practitioners should reconsider their organisation's purpose under the fitness satisficing assumption to make a profit *and* to guarantee survival. Firstly, this means that managers ought to perceive of their firm's overall purpose more broadly. They should take into account the potential impact that an environmental strategy may have on financial performance in the form of opportunities for reducing costs and for increasing revenues (Ambec and Lanoie, 2008), particularly during times of recession. Similarly, this means positioning the company for the future, in terms of impending regulations and fluctuating customer trends through engagement, R&D and the influencing of technologies and systems of tomorrow. This should help firms to gain a first-mover advantage and to be prepared for times of economic revival but also for potential resource scarcities of which 'peak oil' and the 'last oil shock' (Strahan, 2007) may well be one of the first.

Secondly and more importantly, perhaps it is time for practitioners to consider ethical arguments to protect the environment as an active and necessary contribution towards securing the long-term survival of a firm. Even if this attaches a rather 'pragmatic and instrumental' meaning to ethical considerations in the context of environmental strategies (York, 2009), it nevertheless addresses the issue that many people believe firms should do things even if they do not have an economic payback. Especially now in times when there is much debate going on focussing on the general 'short-term thinking' that has beleaguered the financial markets and government planning (GDP growth, energy security, education and training), re-orienting corporate decision making towards investments into the long-term future as a 'survival strategy' may ultimately assist firms on their path towards greater sustainability. This may perhaps also support the idea of tying executive remuneration in form of salaries and (perhaps currently controversial) bonus payments in some form to firm survival in the future.

Similarly, public policy-makers and other stakeholders such as activists and socially responsible investors need to appreciate the role they increasingly play in influencing and changing firms' fitness landscapes. While their individual efforts may have only limited effects, their combined impact is likely to be felt across a population of firms. Greater co-ordination between regulatory bodies (including financial regulators) and activist shareholders, institutional shareholders and even non-governmental agencies may influence the fitness landscape far more dramatically and thus set off 'environmental arms-races' among competing firms.

10.5 FUTURE RESEARCH OPPORTUNITIES

Arising from the limitations and delimitations of the research (Chapter 9) as well as the extensions to theory (Chapter 10), this thesis has laid the foundations for a number of promising future research opportunities designed to validate and extend its contributions. Continuing with the longitudinal theme of the research these opportunities mainly revolve around two key aspects, firstly the choice and source of the data employed, and secondly the relevant methods applied for testing the relationships. In addition, future research should also address a range of other theoretical issues derived from this thesis.

10.5.1 CHOICE AND SOURCES OF DATA

One of the key criteria for reliable scientific inquiry is the ability to replicate the studies. Given the significance of eras in the longitudinal development of environmental strategy, repeating the interview series would obviously be impossible. By contrast, secondary data persists independently in time and can easily be re-investigated. More important, though, is to continue studying the trends that have been observed at the end of the timeframe. By adding 2007 and 2008 KLD data, a better insight into the recent trends should become visible. This would also allow further testing of the oil price, interest rates and shareholder resolutions hypotheses. Particularly since with the onset of economic decline significant changes in oil prices and interest rates have occurred, it would be extremely valuable to explore in how far such short-term trends have affected and impacted upon firms' environmental strategy behaviour. Have firms started to reconsider their investments into more proactive environmental strategies because they have suddenly become less attractive in financial terms? And can firms still pay for them? Or are firms taking a long-term view of the general trends in macro-economic factors and their impact upon firms' economic future?

Also, by including the most recent years of data, a much better understanding of the interrelationship between adaptation and selection forces should result. Consistent with the theoretical discussions in this thesis, the questions of whether proactive firms live longer, and whether new firms added to the S&P500 are more environmentally proactive than the incumbents and/or those firms that disappeared, merit further attention and would shed light on the double-edged forces that shape the existence of change among a population of firms. At the same time, a variety of modifications to the existing studies may also help with teasing out specific details of this evolution. For instance, greater focus upon shorter intervals with other secondary data, similar studies at industry level with industry-specific variables, or generally an investigation into the effects of other macro-economic variables such as the price of carbon, inflation, market growth, and competition intensity may all increase our understanding of the evolution of corporate environmental strategy. Finally, regardless of which aspects are being reconsidered, any future studies with KLD data should undoubtedly take into account control factors such as industry sector, firm size, and corporate and industry growth.

At the same time, however, a variety of research opportunities exist with respect to employing different (secondary) data. First, incorporating other environmental data such as those from the EPA's Toxic Release Index may help with triangulating in how far environmental strategies really are progressing. Equally, the inclusion of data from smaller firms would be a valuable exercise in order to further ascertain what effects firm size has on the evolution of corporate environmental strategy. Finally, and as already discussed in the delimitations section (Chapter 9), in order to obtain globally generalisable results, similar studies in other national contexts such as emerging markets, BRIC countries, and even other EU countries are absolutely necessary.

10.5.2 METHODS

In addition to the variation in terms of secondary data several opportunities exist to complement research in this thesis by means of selecting different research methods. More specifically, a matched pairs analysis of the best performing firms with comparable 'laggards' controlled for by size and industry sector might enable a more differentiated insight into what distinguishes environmentally more proactive firms from those that remained relatively unchanged.

Having identified firms that appear to be relatively more responsive as well as those that are not, perhaps a series of comparative in-depth case studies entailing more than just one interview per firm would without a doubt allow a further analysis of key factors important in the different trajectory paths of those firms. The use of 'processual analysis' (Pettigrew, 1992) appears to be ideal in this context as it studies firms from both inside and outside. These case studies may need to be conducted in longitudinal form and are for this reason very time consuming.

Lastly, as suggested earlier computer simulations may harbour fruitful opportunities for enhancing our understanding of some of complexity theory's more quantitative aspects. Particularly the effects of 'coupling' (Kauffman, 1993) on the ruggedness of the fitness landscape as part of the 'NK fitness model' presents researchers with a simple yet intriguing model for studying in how far the interdependencies of environmental strategy and other functional strategies and attributes have a quantitative impact on organisational fitness and, in turn, their 'search strategies' for peaks on their fitness landscapes.

10.5.3 FURTHER THEORETICAL DEVELOPMENTS

A first concern pertains to the operationalisation of corporate environmental strategy. As indicated by its definition (Sharma, 2000) and the way it has been operationalised in this research, the concept of corporate environmental strategy is extremely multifaceted and difficult to measure in a way that facilitates the longitudinal tracking of its evolution. Both qualitative and quantitative approaches have been used, in this thesis and in past research (Bansal, 2005; Lee and Rhee, 2007; Winn and Angell, 2000). The biggest problem with the operationalisation of the corporate environmental strategy construct is probably that any change in the underlying variable can be of both qualitative and quantitative nature. In other words, a company may change its 'pattern in action over time' in ways that are, for example, either numerically improving, or by displaying a variation of substance rather than amount. For instance, a company could be starting to recycle greater amounts of its waste products, or it could have implemented an environmental management system or outlined an environmental policy. While both would theoretically represent environmentally responsive actions, being able to commensurate the two and consequently establishing some form of longitudinal trend would prove far more challenging. Therefore, the aim of any future research should be to derive at an operationalisation of corporate environmental strategy, which would take both the quantitative and qualitative changes

into account; further studies or even a more differentiated dependent variable that comprises both would be ideal.

A bit more advanced would be an investigation of the effects of environmental performance on organisational fitness. As suggested earlier in this chapter, the definition of a firm's fitness function has been assumed to consist of 'satisficing' both profit *and* survival. While past research has exclusively covered the financial performance aspect of this relationship, virtually nothing is known about the latter half of the definition. This shortcoming is likely to reflect in the first instance the notion that firms are unlikely to go out of business purely on the grounds of poor environmental performance. A range of other aspects would therefore have to be considered, too, in determining whether an unresponsive environmental strategy stance contributed to (or perhaps even represented) a firm's overall poor management quality (Kiernan, 2009), which subsequently led to its demise. Conversely, it would be interesting to ascertain in how far more enlightened approaches towards environmental management but also in other areas of corporate social responsibility, such as strong ethical beliefs ('it's the right thing to do'), represent more implicit attempts to safeguard the long-term survival of the organisation (York, 2009). The next step then would entail an analysis of how the two aspects profitability and survival interact and reinforce each other as part of managers' decision-making and rationalisation processes.

Third, given the theoretical framework's desire to capture organisational behaviour more generally, testing it in other functional areas and contexts as well would help with understanding its usefulness and validity. For example, in how far are human resource policies, capital expenditure strategies and press relations activities geared towards satisficing profit and survival? More relevantly, what consequence has the framework for our understanding and researching of all issues related to corporate social responsibility? Obtaining legitimacy has been identified as a strong driver of many corporate actions in the arena of CSR, so does this represent an underlying effort to find ways of contributing to organisational fitness and secure long-term survival? As with the effects of environmental performance, a lot of research has been conducted to primarily explore the impacts upon financial performance (for example, Brammer and Millington, 2008); maybe it is time to embrace both sides of the fitness function and find ways to integrate them to fully understand the contribution of each.

Finally, the contribution of the thesis may also be gauged by its impact upon our comprehension of general evolutionary processes in other systems. The findings of the thesis agree with the notion of complexity theory that complex behaviour may be the result of relatively simple rules. So, if systems of all kinds behave and evolve in similar ways, the question arises what are the simple rules behind the evolution of other social systems such as the broader economic and political systems? In how far do these rules 'emerge' through the interaction of their system's participants? While further elaboration of these ideas would exceed the scope of this thesis, the application of this logic may provide researchers in other social sciences with a useful and promising starting point.

10.6 THESIS RESTATEMENT AND CONCLUSION

This thesis has argued that companies in the 21st century are exposed to a variety of pressures to respond to a plethora of environmental issues and that understanding how these issues impact companies over time is, therefore, important for corporate practitioners and policy makers alike.

This thesis has investigated the state and evolution of corporate environmental strategy with the help of a multi-study, multi-methods, multi-level, and longitudinal research design. Theoretically grounded in complexity theory, a conceptual framework was developed that portrays organisations as open systems within which agents interact and attempt to improve organisational fitness. By conceptualising the organisational metaphor of 'rugged fitness landscapes' firms are depicted as complex adaptive systems searching for peaks on a constantly changing fitness landscape in order to guarantee economic long-term profit *and* survival.

While study one examined environmental responses among a stratified sample of UK companies through repeated interviews both in 2006 and 2008, the second study drew on KLD data from S&P500 corporations for the period 1991 to 2006 by distinguishing between changes at firm and at population level.

The findings suggest that the state and evolution of corporate environmental strategy are effectively subordinated to contributing towards firms' fitness, whereby firms mostly attempt to remain profitable and obtain social legitimacy. Even over longer periods of time this behaviour has not changed markedly, except that starting from around 2004 higher levels of oil prices and lower interest rates have spurred more proactive environmental

changes among a number of firms. Equally, different motivations, individuals and contextual factors appear to influence the varying patterns of evolution.

The thesis has filled a gap in the existing literature with respect to the lack of conceptual and empirical contributions about the evolution of corporate environmental strategy by providing new insights into how firms are responding to environmental issues and how this behaviour changes over time. These new empirical findings of the state and evolution of corporate environmental strategy appear to be consistent with the conceptual development outlined in the thesis and as such, the research extends various strands of theory including those of environmental strategy, organisational (change) behaviour, and complexity. Finally, the thesis offers some strong conclusions and recommendations with respect to the impact on policy making and regulatory affairs from a governmental point of view. In a similar fashion, it illustrates valuable lessons for corporate practitioners in terms of understanding the role and contribution that corporate environmental strategy can make towards business management. Understanding the complex relationship between firms and their commercial and natural environments, therefore, serves as a first step in solving some of the planet's most pressing problems.

APPENDICES

APPENDIX 1 – THE INTERVIEW SURVEY QUESTIONNAIRE 2006

Environmental Management Survey 2006

Section One: The respondent and some business attributes

Supporting text: If I could, I'd like to ask you a few basic questions about the management of environmental issues in your location and the company in general. [Ask about the products/activity of the company: "Could you possibly tell me a bit more about what the company does?" etc.] Goal: Ice breaking.

1) What is the respondent's job title within the company?

2) Could you give an estimate of the proportion of your company's turnover gained from supplying the government? (To nearest 5%)

Section Two: Pressures for effective management of environmental issues

Supporting text: I'd like to move on to ask you about the environmental issues facing your business and your perceptions of pressures on your company to manage environmental issues effectively.

3) If I could begin by asking, what do you see as the main environmental issue or challenges facing your company?

4) If I could move on and ask you what do you see as the main imperatives/pressures/reasons to manage environmental issues effectively?

Prompts: You might need to provide some hints here – are the main pressures coming from inside the firm or outside it? Is it the force of law/legislation? What role do the economic incentives to reduce resource use/improve efficiency/appeal to green consumers etc. play?

5) I'd like to ask you to think about a specific set of sources of pressures to consider environmental issues and ask you to rate their importance.

Supporting text: I'll introduce each source of pressure and ask you to indicate how much pressure there is on your company from this source on a seven point scale where 1 indicates very little or no pressure, and 7 equates to a very high level of pressure.

- Government/legislators (1) (2) (3) (4) (5) (6) (7)
- Customers (1) (2) (3) (4) (5) (6) (7)
- Employees (1) (2) (3) (4) (5) (6) (7)
- Shareholders (1) (2) (3) (4) (5) (6) (7)
- Environmental organizations (1) (2) (3) (4) (5) (6) (7)
- Local communities (1) (2) (3) (4) (5) (6) (7)

Supporting text: Go through these and when they've all been rated repeat them back to make sure the respondent is clear. If any are very high or low, pick up on one or two and say: "I see you've rated pressure from government very highly, could you expand on that at all? Are there any sources of pressures that I've missed?"

6) I'd like to turn to the importance of environmental legislation and regulation. What do you see as the most important current legislative or regulatory initiatives affecting your business?

Prompts: You want to explore the senses in which these initiatives are important. "Could you say something about the challenges/problems/difficulties that this legislation poses for you?"; "How have those/has this initiatives affected you?" (Name initiatives, if they mention specifics).

7) What do you see as the most important future legislative or regulatory initiatives affecting your business?

Prompts: Again, explore the anticipated effects: "What impacts do you expect these to have on you?"

8) To what extent do you face pressure from your customers to improve your company's environmental impacts? Can you give examples?

Prompts: It might be, for example, that business/public sector customers in some industries expect/demand that companies implement a formal environmental management system or develop environmental policies. It could also be that customers are interested in being involved in aspects of product design (such as amount of packaging involved, the amounts of harmful ingredients used etc.) Do customers monitor the firm's environmental impacts/performance?

9) To what extent do you apply pressure to your suppliers to improve their environmental impacts? Can you give examples?

Prompts: Do they, for example, expect/demand that their suppliers implement a formal environmental management system or develop environmental policies. It could also be that they expect to be involved in issues such as product design of their suppliers (such as amount of packaging involved, the amounts of harmful ingredients used etc.) Do they monitor their suppliers' environmental impacts/performance? What role does the environmental performance of suppliers play in choosing between alternative suppliers?

Section Three: The management of environmental issues in your company

Prompts: Now I'd like to explore how environmental issues are managed in your site

10) Is your company involved in any environmental initiatives? (Yes) (No)

Clarification: An environmental initiative is something that reduces your company's impact on the natural environment. Examples might include investments in plant that has reduced polluting emissions, participation in a recycling scheme etc.

11) If yes, perhaps you could think of a particular environmental initiative that your company has been engaged in?

Prompts: Perhaps you could begin by describing the initiative. How did the initiative come about? What were the major factors that motivated you to take that action? Whose idea was it? Who was responsible for implementing it? What impact did you expect it would

have on your business? Did you experience any difficulties in implementing it? How were these solved? What were the consequences/impacts on the organisation? Did you need any advice/information in order to implement the initiative? Where did you get this from?

12) Is your site involved in any of the following specific types of initiatives? [Tick if yes]

- Waste paper recycling ( )
- Toner cartridge recycling ( )
- Use of low energy lighting ( )
- Cistern water displacement devices ( )
- Water flow restrictor/regulators ( )

13) Does your company operate a certified environmental management system?

Yes, ISO 14001 ( )

Yes, EMAS ( )

Yes, other _____

No ( )

Follow-ups: If yes, how did that come about? What were the main motivations in implementing one? If no, why not? Any plans to do so in the future?

14) What resources has your company invested in improving your company's environmental impacts? (Open ended question, then ask specific).

- One full-time post ( )
- More than one full-time post ( )

- Part of a wider post ( )
- Consultants ( )
- None ( )
- Other _____

Section Four: Objectives of effective environmental management and obstacles to achieving it

15) What do you see as the major benefits to effective environmental management in your company?

16) Please specify the extent to which each of the following obstacles has influenced environmental initiatives in your company: (1 refers to not at all, 7 very much)

Internal obstacles:

- Lack of senior management support (1) (2) (3) (4) (5) (6) (7)
- Lack of skilled human resources (1) (2) (3) (4) (5) (6) (7)
- Lack of financial resources (1) (2) (3) (4) (5) (6) (7)
- Lack of information on tools/instruments (1) (2) (3) (4) (5) (6) (7)

External obstacles:

- Lack of clear regulation (1) (2) (3) (4) (5) (6) (7)
- Lack of technological solutions available (1) (2) (3) (4) (5) (6) (7)

- Lack of market demand for green products (1) (2) (3) (4) (5) (6) (7)

Section Five: Environmental management in your firm in the future

17) Do you have any processes that are designed to anticipate future threats and/or opportunities in the context of managing your environmental impacts?

Prompts: If yes – what processes? Could they describe them? How would they know of a new technology that reduced resource needs for example?

Clarification: Do they, for example, conduct a regular annual audit of environmental impacts to identify issues to be address? Do they have a plan for managing environmental impacts – how often is this reviewed?

APPENDIX 2 – THE INTERVIEW SURVEY QUESTIONNAIRE 2008

ENVIRONMENTAL MANAGEMENT SURVEY 2008

Date and Time of Interview:

Company Name:

Respondent Name:

Respondent's job title/role:

1) What do you see as the main pressures and reasons to manage environmental issues effectively in your firm? And what are the major benefits of doing so to your company?

2) I'd like to ask you to think about a specific set of sources of pressures to consider environmental issues and ask you to rate their importance.

Government/legislators

No Pressure — In Between — A Very High Level of Pressure

① ② ③ ④ ⑤ ⑥ ⑦

Customers

No Pressure — In Between — A Very High Level of Pressure

① ② ③ ④ ⑤ ⑥ ⑦

Employees

No Pressure — In Between — A Very High Level of Pressure

① ② ③ ④ ⑤ ⑥ ⑦

Shareholders/investors

No Pressure — In Between — A Very High Level of Pressure

① ② ③ ④ ⑤ ⑥ ⑦

Environmental pressure groups

No Pressure — In Between — A Very High Level of Pressure

① ② ③ ④ ⑤ ⑥ ⑦

Local communities

No Pressure — In Between — A Very High Level of Pressure

① ② ③ ④ ⑤ ⑥ ⑦

[Others?]

No Pressure — In Between — A Very High Level of Pressure

① ② ③ ④ ⑤ ⑥ ⑦

3) Does your company (still) operate a certified environmental management system?

Yes [ ]

No [ ]

Which one?

ISO14000 [ ]

EMAS [ ]

Green Dragon [ ]

Other [ ]

4) Please specify the extent to which each of the following obstacles has influenced environmental initiatives in your company.

Lack of senior management support

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Lack of skilled human resources

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Lack of financial resources

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Lack of information on tools/instruments

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Lack of clear regulations

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Lack of technological solutions available

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Lack of market demand for green products

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

[Others?]

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

5) In how far has environmental management within your firm changed over the last three years since we last spoke?

6) Which environmental initiatives / processes / plans / investments after their initial implementation have you as a firm subsequently cancelled / reversed / reduced? Why?

7) In how far have your personal views changed over the last 3 years since we last spoke with respect to environmental management in general?

8) What has caused your change of mind as an individual and (how) have you acted on it? Or, if no change, why so?

9) Who, in your view, initiates and drives environmental responses within your firm?

Nobody [ ]

Senior management only [ ]

Environmental managers [ ]

All employees [ ]

Other [ ]

10) How important are the following macro-economic factors in your firm's environmental decision making?

Oil price

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Bank of England interest rates

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

General business sentiment

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Consumer confidence

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

House prices / mortgage rates

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Stock market indices

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Corporation tax rate

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Price of carbon

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

Other? _____

None In Between Very Much

① ② ③ ④ ⑤ ⑥ ⑦

11) How strong, do you think, is your company's environmental strategy integrated with / tied to / dependent on other functional strategies within your firm?

12) How does the current economic situation affect environmental management in your firm and what is your general outlook for the coming three years

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